US009176954B2

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Ren et al.

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(45) **Date of Patent: Nov. 3, 2015**

(54) **INFORMATION PROCESSING APPARATUS, INFORMATION PROCESSING METHOD, AND NON-TRANSITORY COMPUTER READABLE MEDIUM FOR PRESENTING ASSOCIATED INFORMATION UPON SELECTION OF INFORMATION**

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(73) Assignee: **FUJI XEROX CO., LTD.**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/369,972**

(22) Filed: **Feb. 9, 2012**

(65) **Prior Publication Data**

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**

G06F 17/21	(2006.01)
G06F 17/30	(2006.01)

(52) **U.S. Cl.**
CPC ***G06F 17/30011*** (2013.01); ***G06F 17/211*** (2013.01)

(58) **Field of Classification Search**
CPC G06F 17/30; G06F 17/00
See application file for complete search history.

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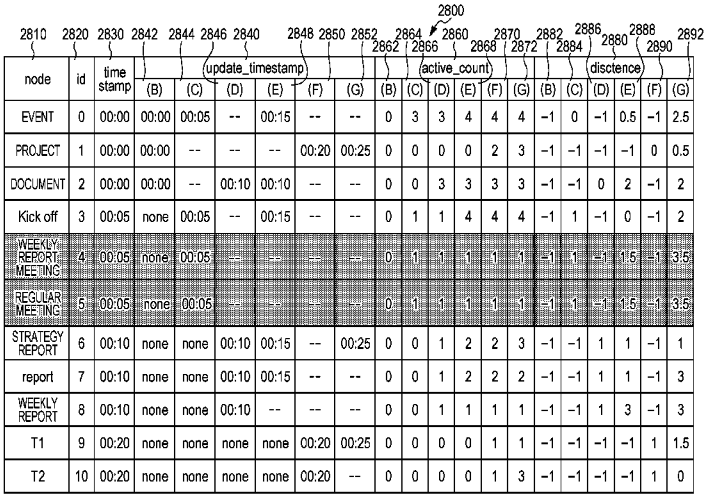
Primary Examiner — Farhan Syed
(74) *Attorney, Agent, or Firm* — Sughrue Mion, PLLC

(57) **ABSTRACT**

An information processing apparatus includes a presenting unit, an information extracting unit, a characteristics extracting unit, and a limiting unit. The presenting unit presents information. The information extracting unit extracts, in a case where the information presented by the presenting unit is selected, information associated with the selected information from a storing unit that stores plural pieces of information and association between the plural pieces of information. The characteristics extracting unit extracts characteristics relating to the plural pieces of information and the association between the plural pieces of information. The limiting unit limits, in a case where the presenting unit presents the information extracted by the information extracting unit and the number of pieces of information to be presented is greater than or equal to or greater than a predetermined number, information to be presented on the basis of the characteristics extracted by the characteristics extracting unit.

6 Claims, 21 Drawing Sheets


2800
2810
2820
2830
2842
2844
2846
2840
2848
2850
2852
2862
2864
2866
2860
2868
2870
2872
2882
2884
2886
2880
2888
2890
2892

node	id	time stamp	update_timestamp						active_count						disctence					
			(B)	(C)	(D)	(E)	(F)	(G)	(B)	(C)	(D)	(E)	(F)	(G)	(B)	(C)	(D)	(E)	(F)	(G)
EVENT	0	00:00	00:00	00:05	--	00:15	--	--	0	3	3	4	4	4	−1	0	−1	0.5	−1	2.5
PROJECT	1	00:00	00:00	--	--	--	00:20	00:25	0	0	0	0	2	3	−1	−1	−1	−1	0	0.5
DOCUMENT	2	00:00	00:00	--	00:10	00:10	--	--	0	0	3	3	3	3	−1	−1	0	2	−1	2
Kick off	3	00:05	none	00:05	--	00:15	--	--	0	1	1	4	4	4	−1	1	−1	0	−1	2
WEEKLY REPORT MEETING	4	00:05	none	00:05	--	--	--	--	0	1	1	1	1	1	−1	1	−1	1.5	−1	3.5
REGULAR MEETING	5	00:05	none	00:05	--	--	--	--	0	1	1	1	1	1	−1	1	−1	1.5	−1	3.5
STRATEGY REPORT	6	00:10	none	none	00:10	00:15	--	00:25	0	0	1	2	2	3	−1	−1	1	1	−1	1
report	7	00:10	none	none	00:10	00:15	--	--	0	0	1	2	2	2	−1	−1	1	1	−1	3
WEEKLY REPORT	8	00:10	none	none	00:10	--	--	--	0	0	1	1	1	1	−1	−1	1	3	−1	3
T1	9	00:20	none	none	none	none	00:20	00:25	0	0	0	0	1	1	−1	−1	−1	−1	1	1.5
T2	10	00:20	none	none	none	none	00:20	--	0	0	0	0	1	3	−1	−1	−1	−1	1	0

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Notification of Reason for Refusal dated Mar. 17, 2015, issued by the Japanese Patent Office in counterpart Japanese application No. 2011-205991.

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FIG. 1

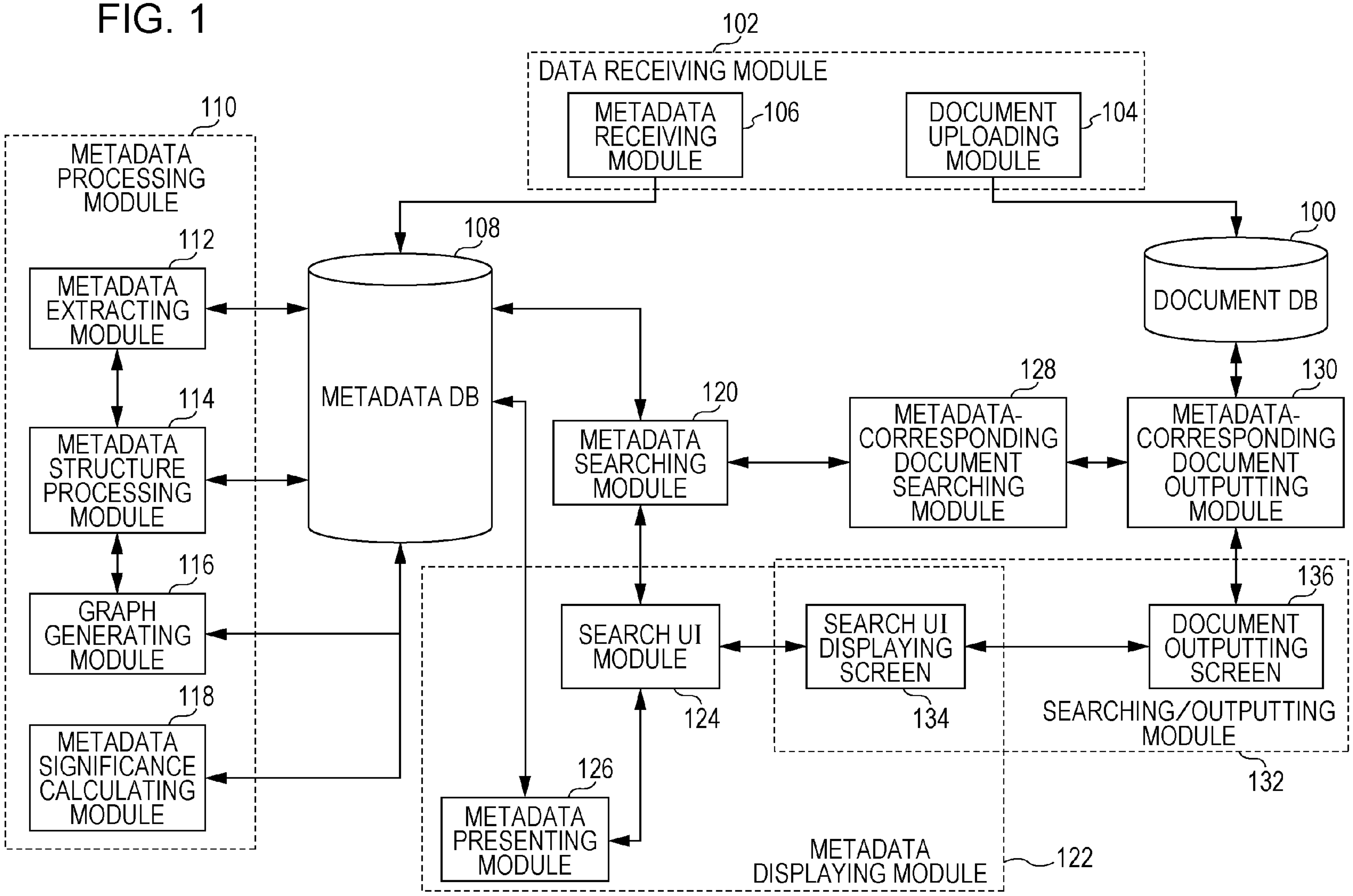

102
DATA RECEIVING MODULE
METADATA RECEIVING MODULE
106
DOCUMENT UPLOADING MODULE
104
110
METADATA PROCESSING MODULE
112
METADATA EXTRACTING MODULE
114
METADATA STRUCTURE PROCESSING MODULE
116
GRAPH GENERATING MODULE
118
METADATA SIGNIFICANCE CALCULATING MODULE
108
METADATA DB
100
DOCUMENT DB
120
METADATA SEARCHING MODULE
128
METADATA-CORRESPONDING DOCUMENT SEARCHING MODULE
130
METADATA-CORRESPONDING DOCUMENT OUTPUTTING MODULE
136
SEARCH UI MODULE
124
SEARCH UI DISPLAYING SCREEN
134
DOCUMENT OUTPUTTING SCREEN
SEARCHING/OUTPUTTING MODULE
132
126
METADATA PRESENTING MODULE
METADATA DISPLAYING MODULE
122

FIG. 2

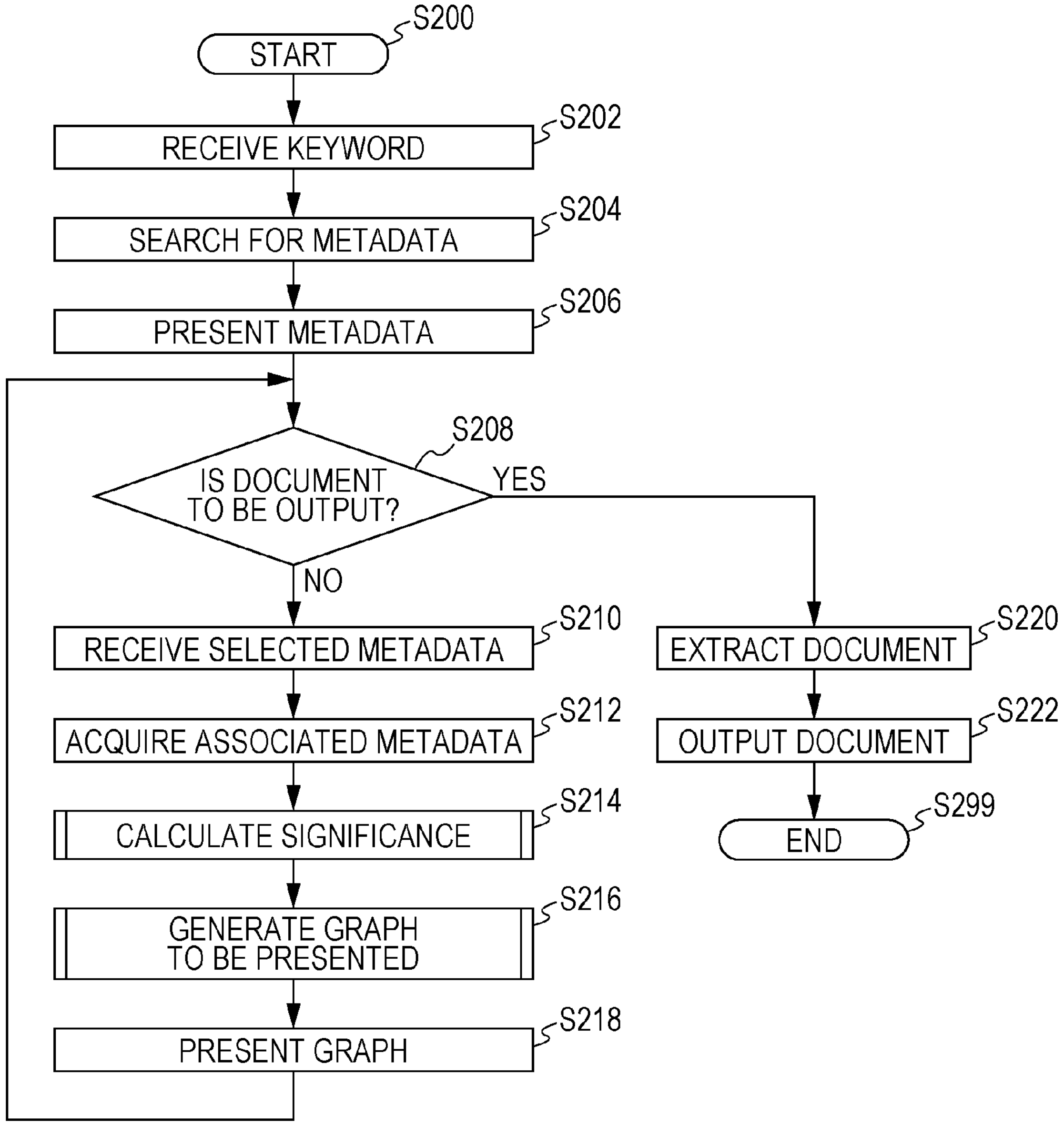

S200
START
S202
RECEIVE KEYWORD
S204
SEARCH FOR METADATA
S206
PRESENT METADATA
S208
IS DOCUMENT TO BE OUTPUT?
YES
NO
S210
RECEIVE SELECTED METADATA
S212
ACQUIRE ASSOCIATED METADATA
S214
CALCULATE SIGNIFICANCE
S216
GENERATE GRAPH TO BE PRESENTED
S218
PRESENT GRAPH
S220
EXTRACT DOCUMENT
S222
OUTPUT DOCUMENT
S299
END

FIG. 3

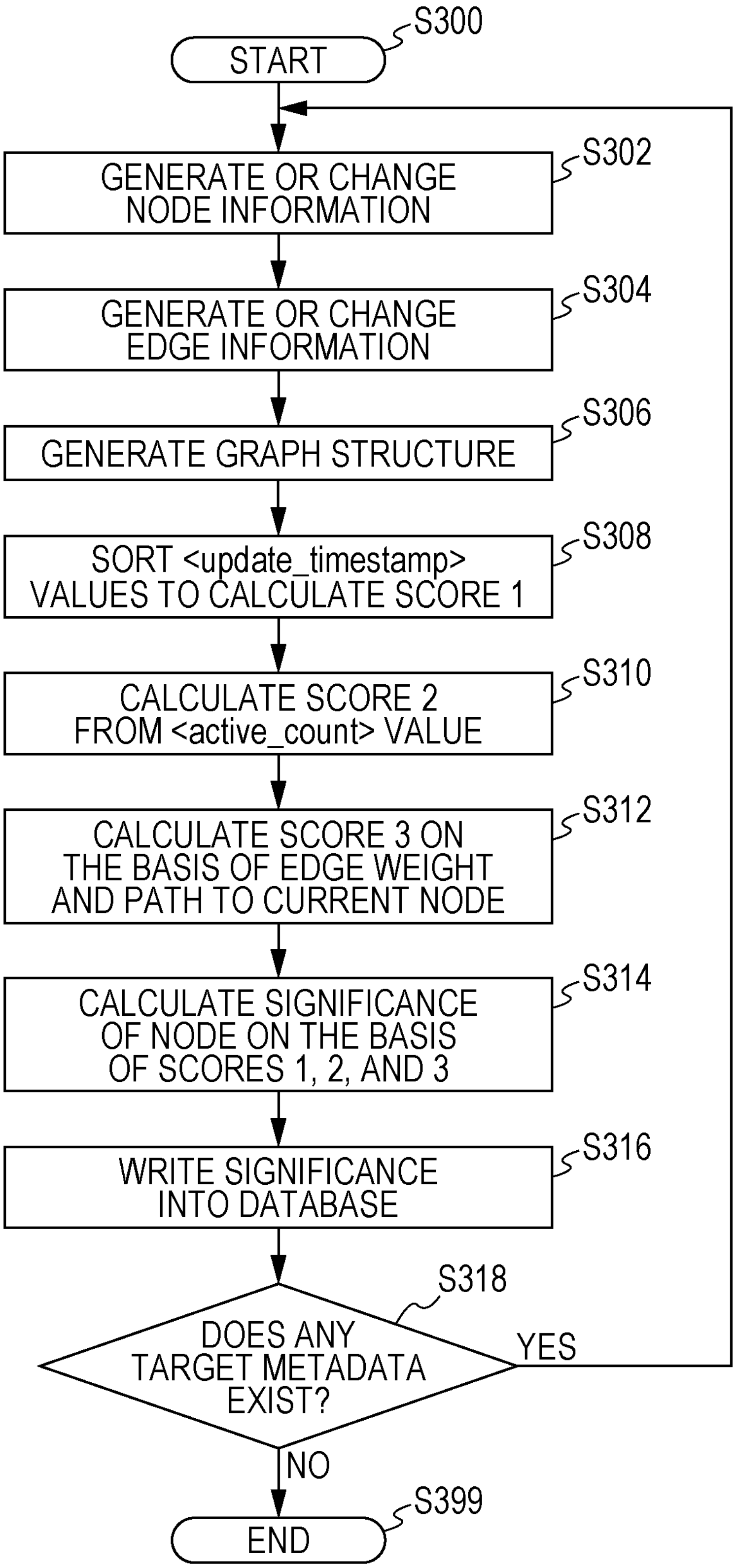

S300
START
S302
GENERATE OR CHANGE NODE INFORMATION
S304
GENERATE OR CHANGE EDGE INFORMATION
S306
GENERATE GRAPH STRUCTURE
S308
SORT <update_timestamp> VALUES TO CALCULATE SCORE 1
S310
CALCULATE SCORE 2 FROM <active_count> VALUE
S312
CALCULATE SCORE 3 ON THE BASIS OF EDGE WEIGHT AND PATH TO CURRENT NODE
S314
CALCULATE SIGNIFICANCE OF NODE ON THE BASIS OF SCORES 1, 2, AND 3
S316
WRITE SIGNIFICANCE INTO DATABASE
S318
DOES ANY TARGET METADATA EXIST?
YES
NO
S399
END

FIG. 4

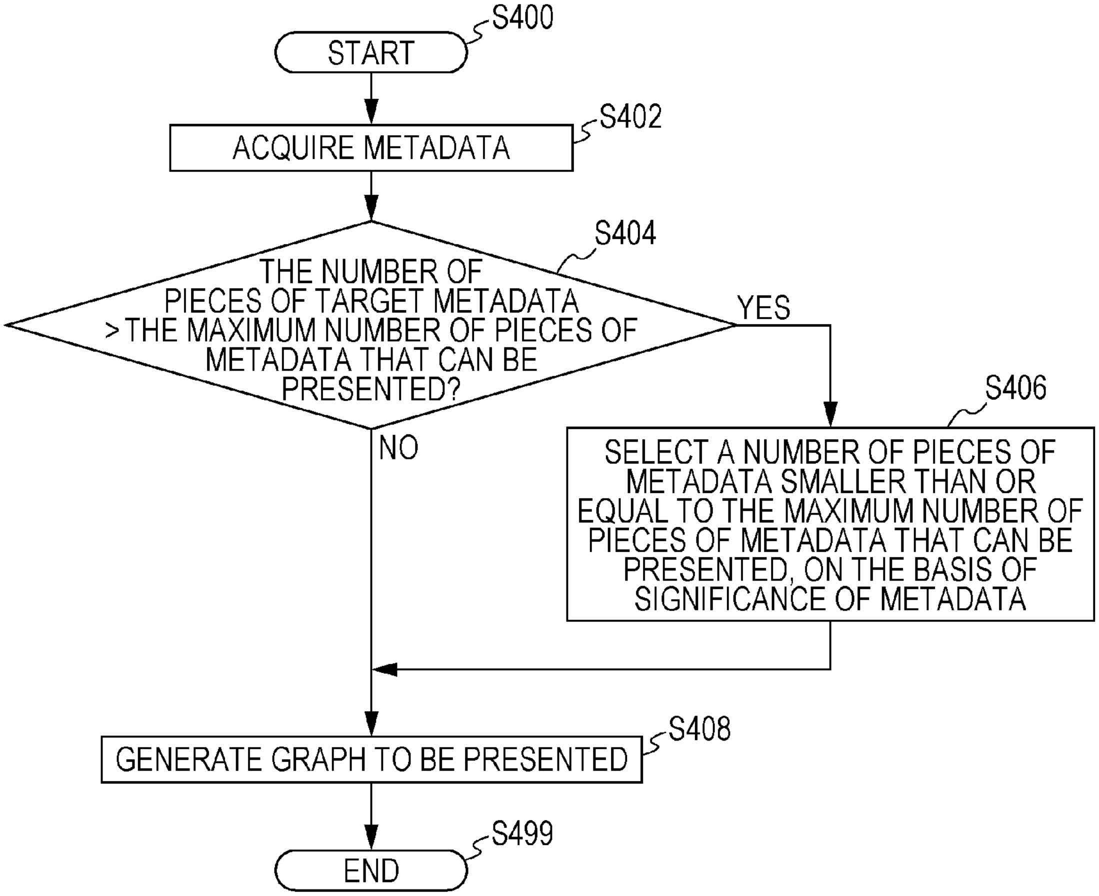
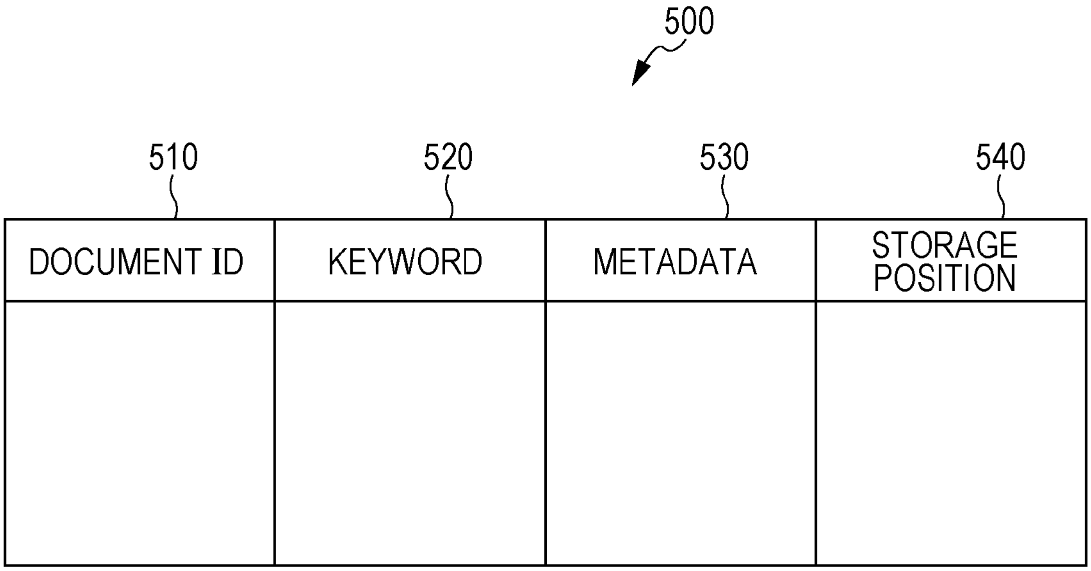

S400
START
S402
ACQUIRE METADATA
S404
THE NUMBER OF PIECES OF TARGET METADATA >THE MAXIMUM NUMBER OF PIECES OF METADATA THAT CAN BE PRESENTED?
YES
NO
S406
SELECT A NUMBER OF PIECES OF METADATA SMALLER THAN OR EQUAL TO THE MAXIMUM NUMBER OF PIECES OF METADATA THAT CAN BE PRESENTED, ON THE BASIS OF SIGNIFICANCE OF METADATA
S408
GENERATE GRAPH TO BE PRESENTED
S499
END

FIG. 5



DOCUMENT ID	KEYWORD	METADATA	STORAGE POSITION

FIG. 6

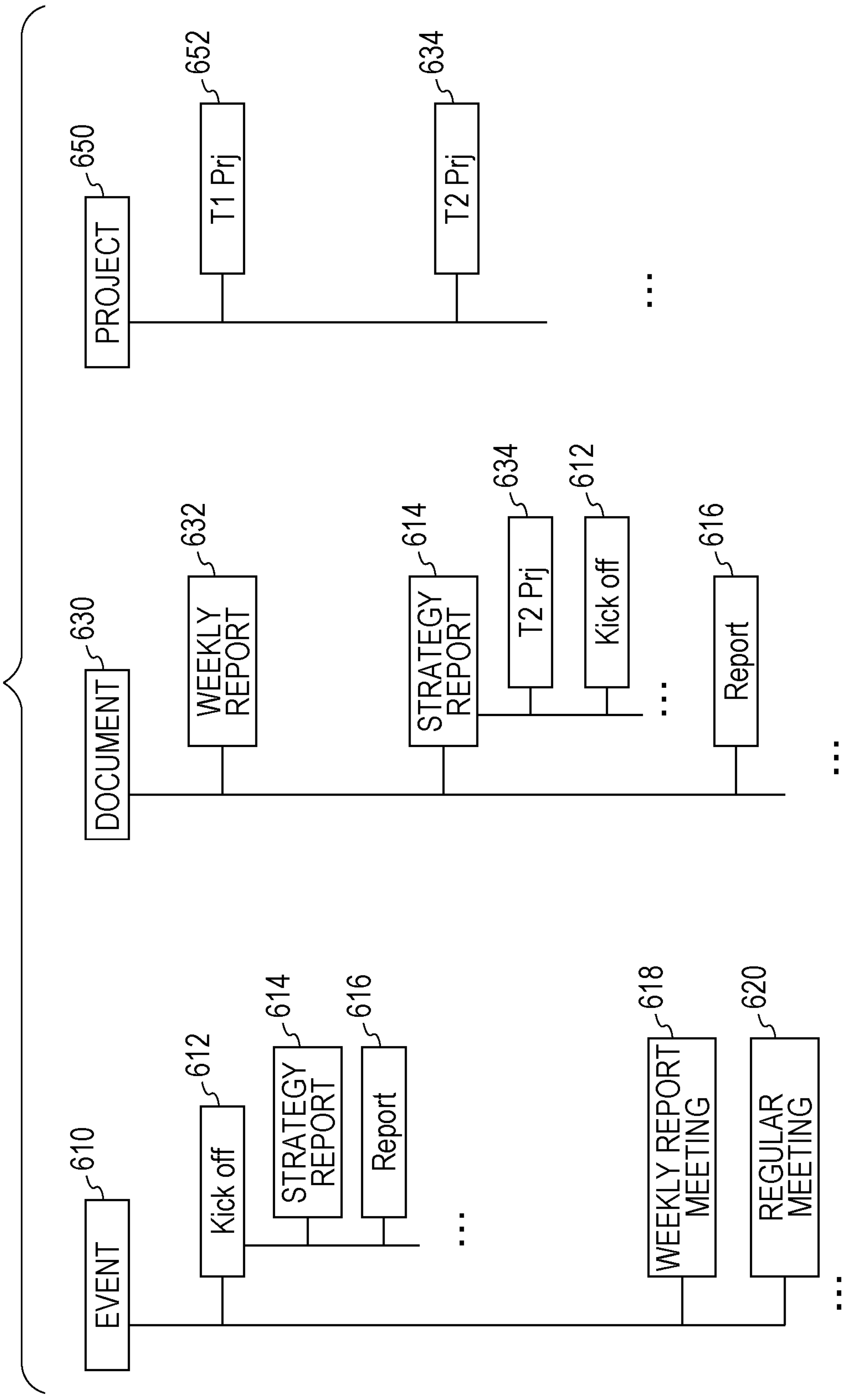

EVENT
610
Kick off
612
STRATEGY REPORT
614
Report
616
...
WEEKLY REPORT MEETING
618
REGULAR MEETING
620
...
DOCUMENT
630
WEEKLY REPORT
632
STRATEGY REPORT
614
T2 Prj
634
Kick off
612
...
Report
616
...
PROJECT
650
T1 Prj
652
T2 Prj
634
...

FIG. 7

710 700 720

METADATA NAME	METADATA VALUE
title	KICK OFF FOR SECOND SEMESTER OF 2010
kind	Kick off
proj	T2
has_file	STRATEGY FOR SECOND SEMESTER.ppt
⋮	⋮

FIG. 8

810 800 820

METADATA NAME	METADATA VALUE
title	STRATEGY FOR SECOND SEMESTER.ppt
kind	STRATEGY REPORT
proj	T2
event	KICK OFF FOR SECOND SEMESTER OF 2010
⋮	⋮

FIG. 9

910 900 920

METADATA NAME	METADATA VALUE
title	T2
kind	PROJECT
has_file	STRATEGY FOR SECOND SEMESTER.ppt
⋮	⋮

FIG. 10

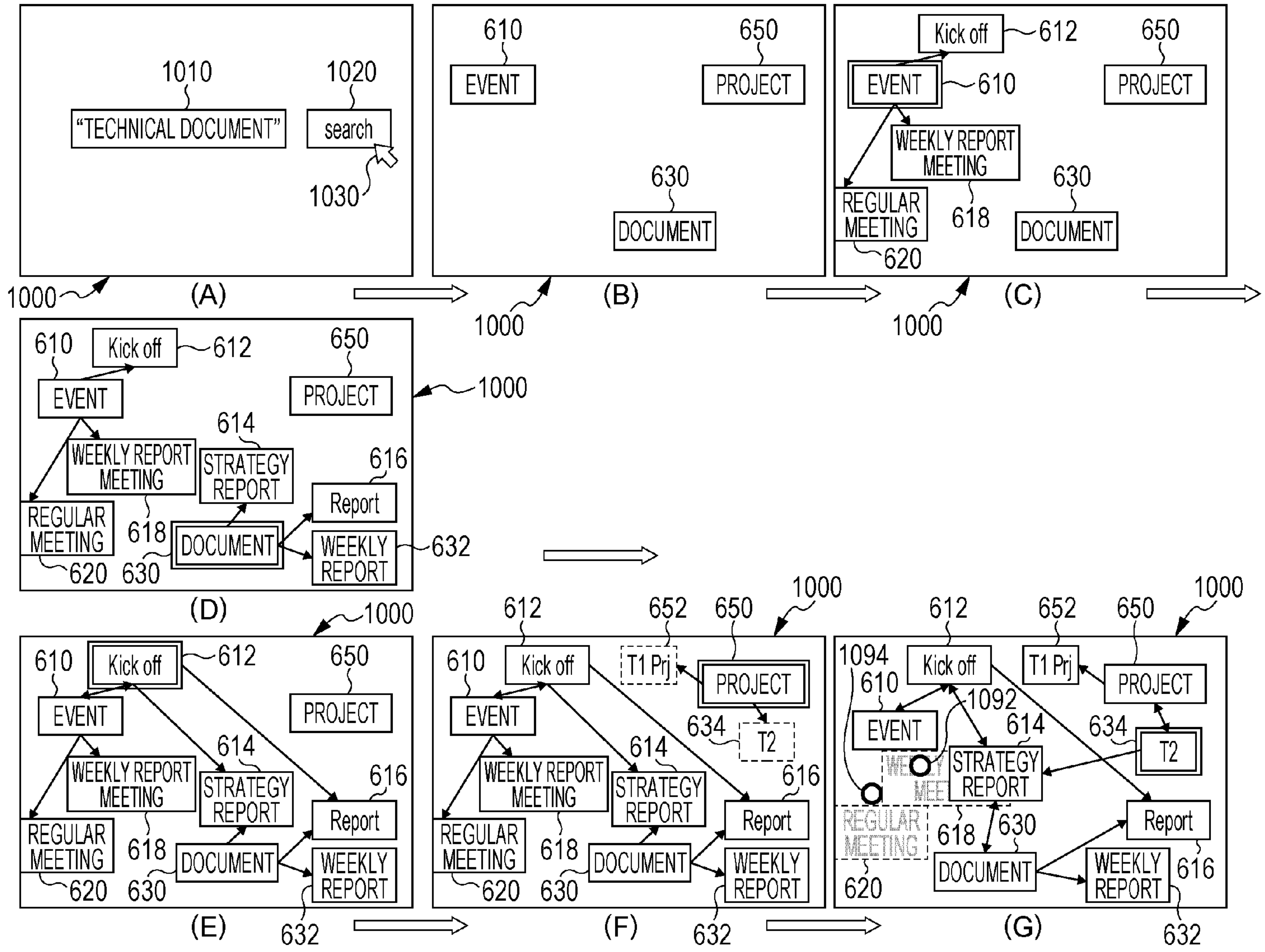

1010
"TECHNICAL DOCUMENT"
1020
search
1030
1000
(A)
610
EVENT
650
PROJECT
630
DOCUMENT
(B)
Kick off
612
610
WEEKLY REPORT MEETING
618
REGULAR MEETING
620
(C)
614
STRATEGY REPORT
616
Report
632
WEEKLY REPORT
(D)
(E)
652
T1 Prj
634
T2
(F)
1094
1092
(G)

FIG. 11

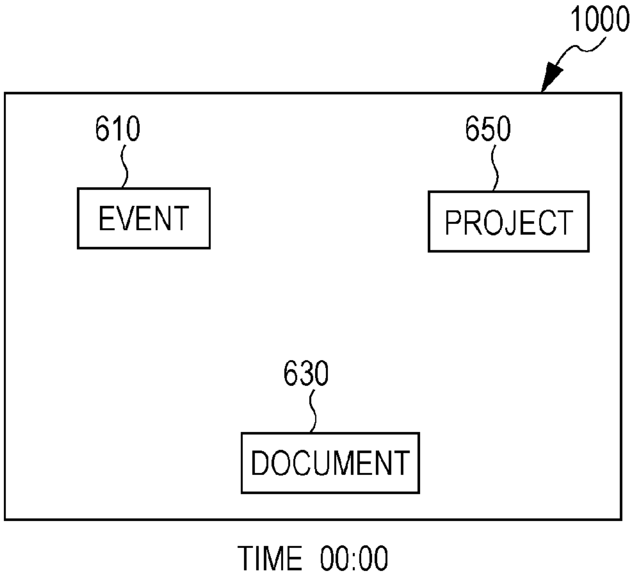
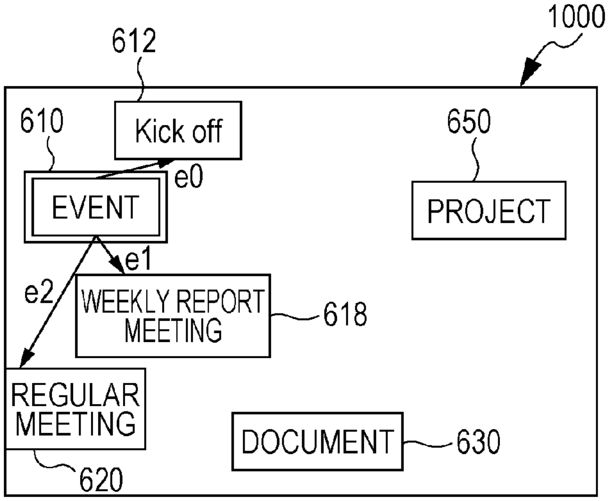


FIG. 12

1200

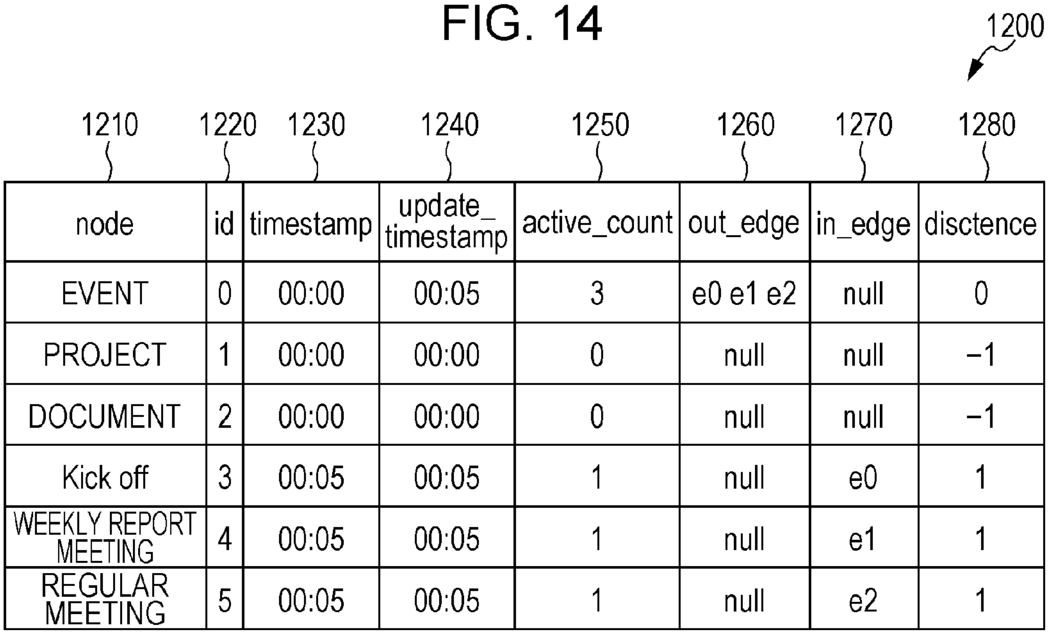
1210	1220	1230	1240	1250	1260	1270	1280
node	id	timestamp	update_ timestamp	active_count	out_edge	in_edge	disctence
EVENT	0	00:00	00:00	0	null	null	−1
PROJECT	1	00:00	00:00	0	null	null	−1
DOCUMENT	2	00:00	00:00	0	null	null	−1

FIG. 13



TIME 00:05

FIG. 14


1200
1210
1220
1230
1240
1250
1260
1270
1280

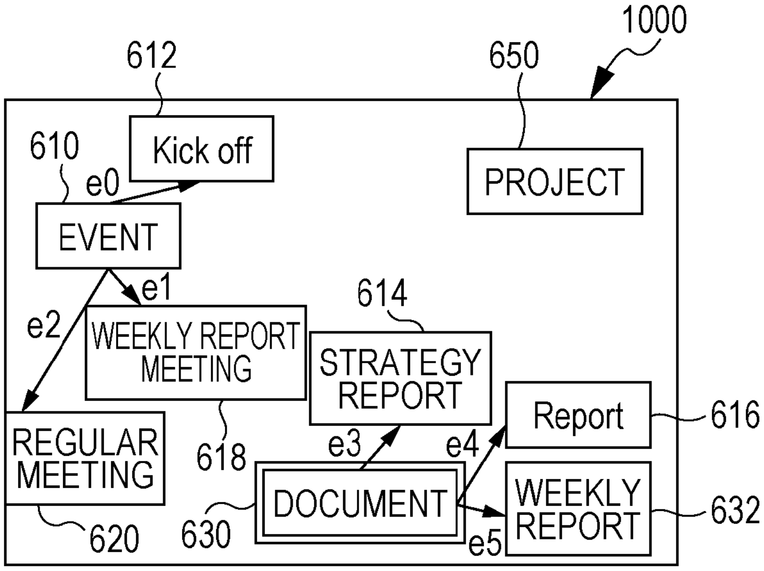
node	id	timestamp	update_ timestamp	active_count	out_edge	in_edge	disctence
EVENT	0	00:00	00:05	3	e0 e1 e2	null	0
PROJECT	1	00:00	00:00	0	null	null	−1
DOCUMENT	2	00:00	00:00	0	null	null	−1
Kick off	3	00:05	00:05	1	null	e0	1
WEEKLY REPORT MEETING	4	00:05	00:05	1	null	e1	1
REGULAR MEETING	5	00:05	00:05	1	null	e2	1

FIG. 15

1500

1510	1520	1530	1540
edge id	active-timestamp	update_active_timestamp	active_count
e0	00:05	00:05	1
e1	00:05	00:05	1
e2	00:05	00:05	1

FIG. 16



TIME 00:10

FIG. 17

1200

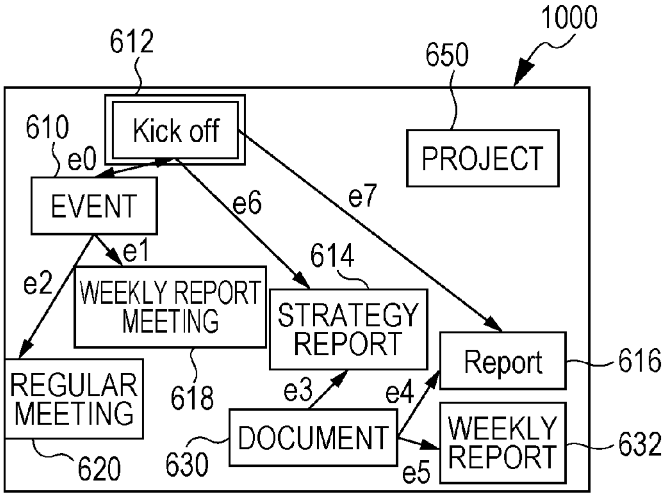
1210	1220	1230	1240	1250	1260	1270	1280
node	id	timestamp	update_ timestamp	active_count	out_edge	in_edge	disctence
EVENT	0	00:00	00:05	3	e0 e1 e2	null	−1
PROJECT	1	00:00	00:00	0	null	null	−1
DOCUMENT	2	00:00	00:10	3	e3 e4 e5	null	0
Kick off	3	00:05	00:05	1	null	e0	−1
WEEKLY REPORT MEETING	4	00:05	00:05	1	null	e1	−1
REGULAR MEETING	5	00:05	00:05	1	null	e2	−1
STRATEGY REPORT	6	00:10	00:10	1	null	e3	1
Report	7	00:10	00:10	1	null	e4	1
WEEKLY REPORT	8	00:10	00:10	1	null	e5	1

FIG. 18

1500

1510	1520	1530	1540
edge id	active-timestamp	update_active_timestamp	active_count
e0	00:05	00:05	1
e1	00:05	00:05	1
e2	00:05	00:05	1
e3	00:10	00:10	1
e4	00:10	00:10	1
e5	00:10	00:10	1

FIG. 19



TIME 00:15

FIG. 20

1200

node	id	timestamp	update_ timestamp	active_count	out_edge	in_edge	disctence
1210	1220	1230	1240	1250	1260	1270	1280
EVENT	0	00:00	00:15	4	e0 e1 e2	null	0.5
PROJECT	1	00:00	00:00	0	null	null	−1
DOCUMENT	2	00:00	00:10	3	e3 e4 e5	null	2
Kick off	3	00:05	00:15	4	e6 e7	e0	0
WEEKLY REPORT MEETING	4	00:05	00:05	1	null	e1	1.5
REGULAR MEETING	5	00:05	00:05	1	null	e2	1.5
STRATEGY REPORT	6	00:10	00:15	2	null	e3 e6	1
Report	7	00:10	00:15	2	null	e4 e7	1
WEEKLY REPORT	8	00:10	00:10	1	null	e5	3

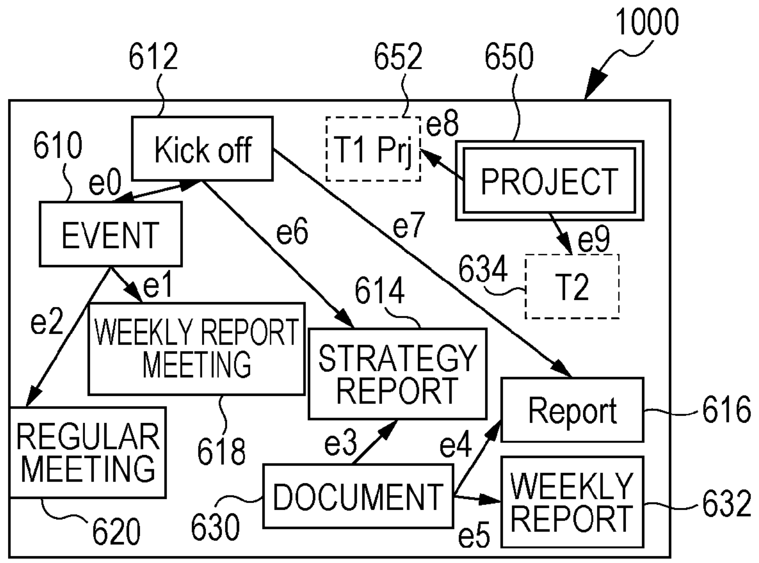
FIG. 21

1500

1510 1520 1530 1540

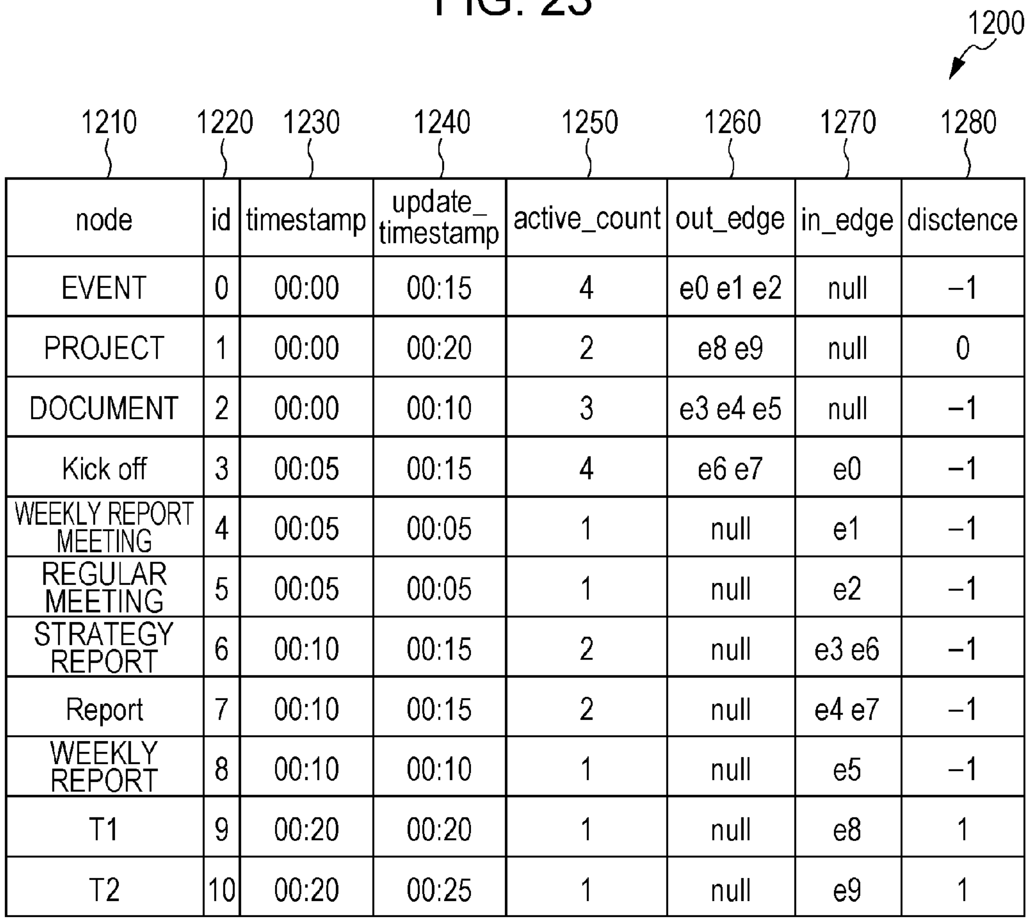
edge id	active-timestamp	update_active_timestamp	active_count
e0	00:05	00:15	2
e1	00:05	00:05	1
e2	00:05	00:05	1
e3	00:10	00:10	1
e4	00:10	00:10	1
e5	00:10	00:10	1
e6	00:15	00:15	1
e7	00:15	00:15	1

FIG. 22



TIME 00:20

FIG. 23


1200
1210
1220
1230
1240
1250
1260
1270
1280

node	id	timestamp	update_ timestamp	active_count	out_edge	in_edge	disctence
EVENT	0	00:00	00:15	4	e0 e1 e2	null	−1
PROJECT	1	00:00	00:20	2	e8 e9	null	0
DOCUMENT	2	00:00	00:10	3	e3 e4 e5	null	−1
Kick off	3	00:05	00:15	4	e6 e7	e0	−1
WEEKLY REPORT MEETING	4	00:05	00:05	1	null	e1	−1
REGULAR MEETING	5	00:05	00:05	1	null	e2	−1
STRATEGY REPORT	6	00:10	00:15	2	null	e3 e6	−1
Report	7	00:10	00:15	2	null	e4 e7	−1
WEEKLY REPORT	8	00:10	00:10	1	null	e5	−1
T1	9	00:20	00:20	1	null	e8	1
T2	10	00:20	00:25	1	null	e9	1

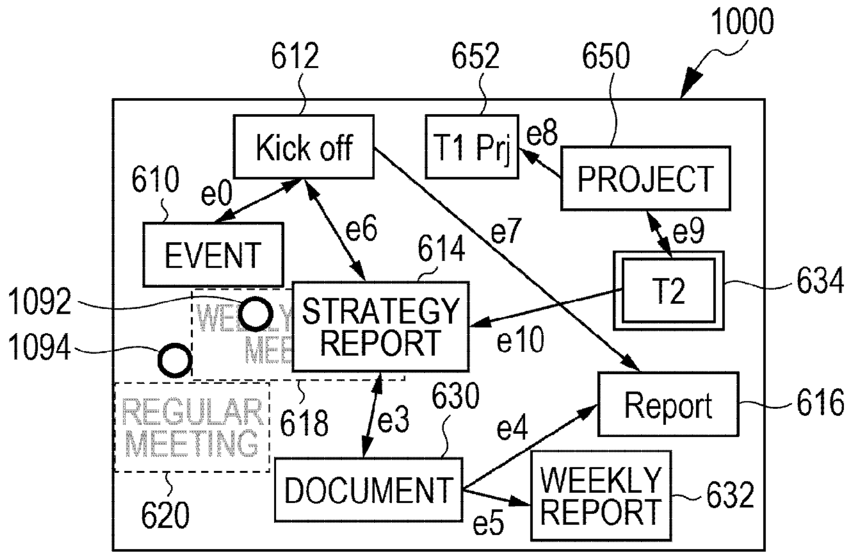
FIG. 24

1500

1510 1520 1530 1540

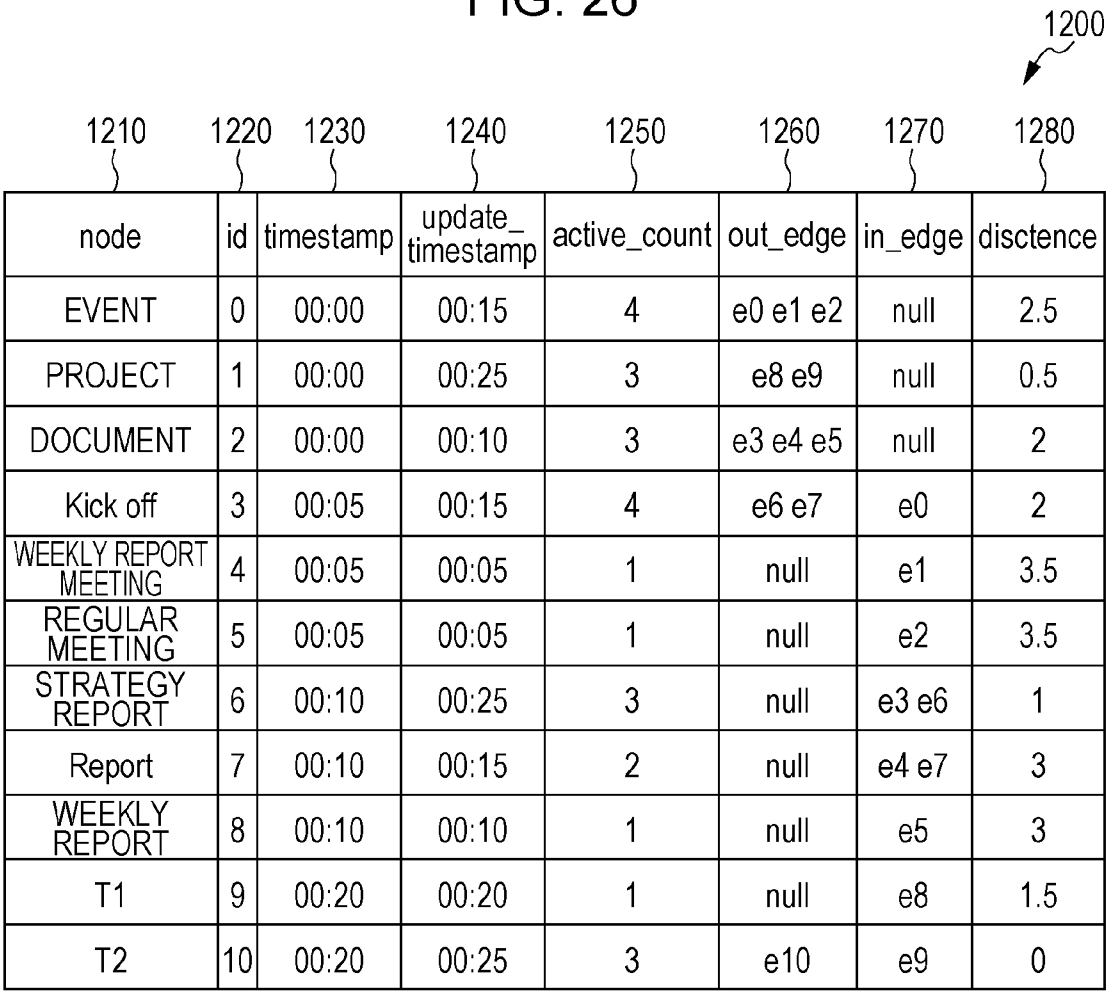
edge id	active-timestamp	update_active_timestamp	active_count
e0	00:05	00:15	2
e1	00:05	00:05	1
e2	00:05	00:05	1
e3	00:10	00:10	1
e4	00:10	00:10	1
e5	00:10	00:10	1
e6	00:15	00:15	1
e7	00:15	00:15	1
e8	00:20	00:20	1
e9	00:20	00:20	1

FIG. 25



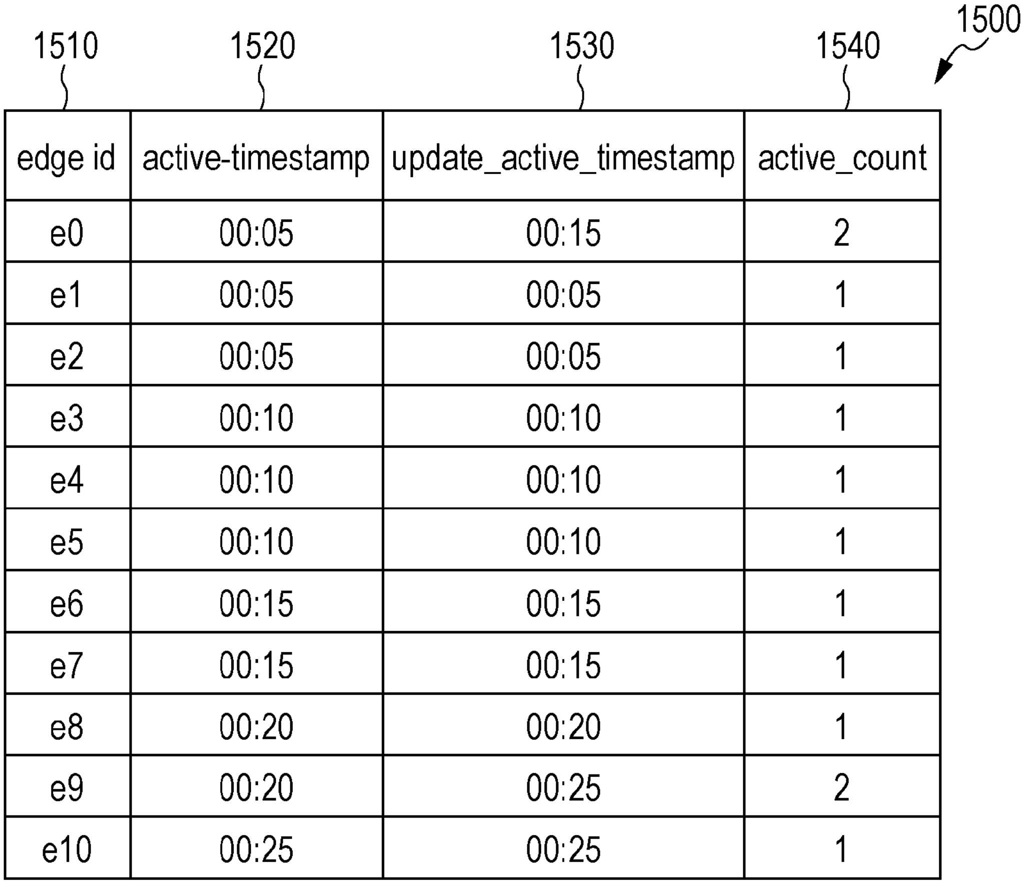
TIME 00:25

FIG. 26


1200
1210
1220
1230
1240
1250
1260
1270
1280

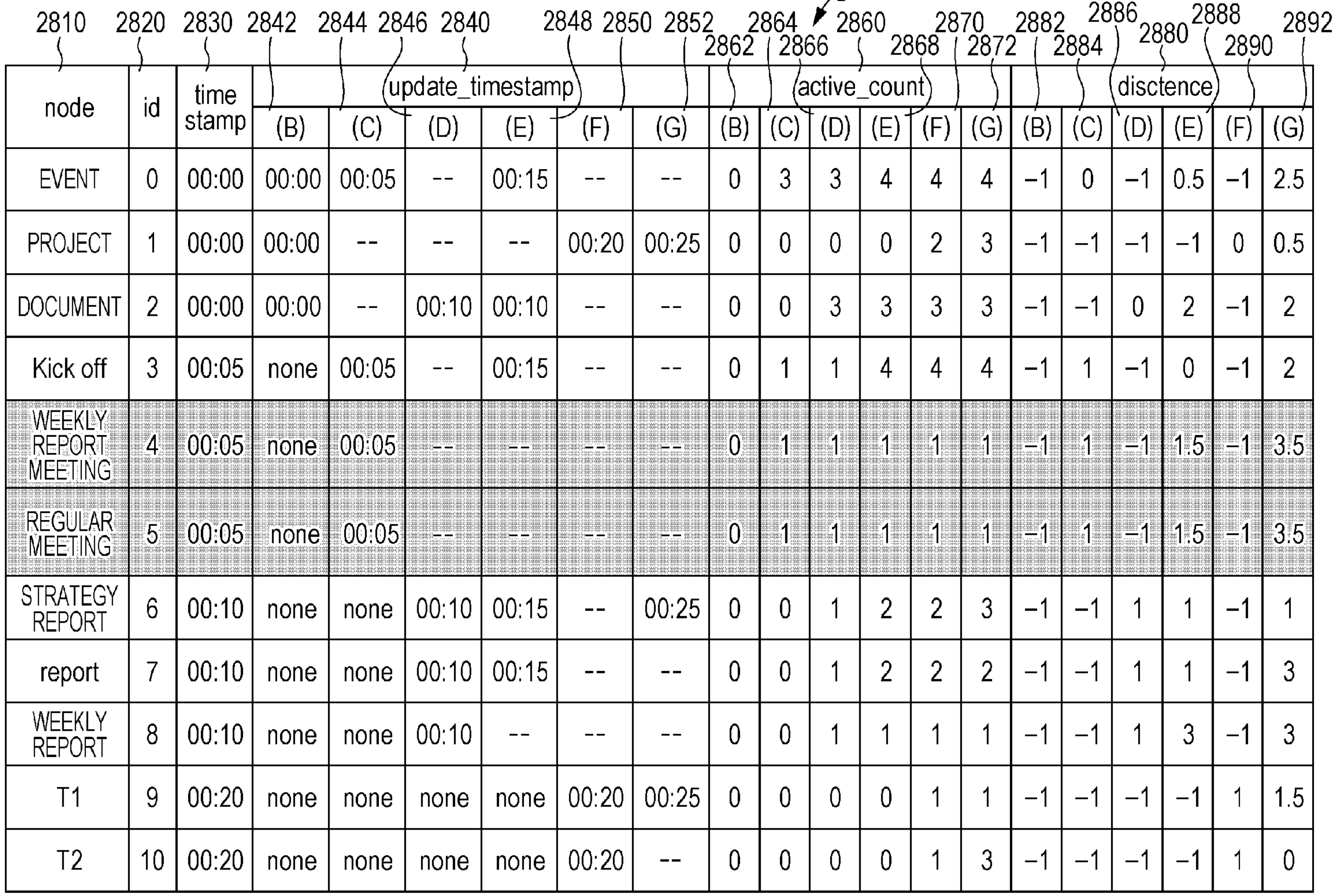
node	id	timestamp	update_ timestamp	active_count	out_edge	in_edge	disctence
EVENT	0	00:00	00:15	4	e0 e1 e2	null	2.5
PROJECT	1	00:00	00:25	3	e8 e9	null	0.5
DOCUMENT	2	00:00	00:10	3	e3 e4 e5	null	2
Kick off	3	00:05	00:15	4	e6 e7	e0	2
WEEKLY REPORT MEETING	4	00:05	00:05	1	null	e1	3.5
REGULAR MEETING	5	00:05	00:05	1	null	e2	3.5
STRATEGY REPORT	6	00:10	00:25	3	null	e3 e6	1
Report	7	00:10	00:15	2	null	e4 e7	3
WEEKLY REPORT	8	00:10	00:10	1	null	e5	3
T1	9	00:20	00:20	1	null	e8	1.5
T2	10	00:20	00:25	3	e10	e9	0

FIG. 27


1510
1520
1530
1540
1500

edge id	active-timestamp	update_active_timestamp	active_count
e0	00:05	00:15	2
e1	00:05	00:05	1
e2	00:05	00:05	1
e3	00:10	00:10	1
e4	00:10	00:10	1
e5	00:10	00:10	1
e6	00:15	00:15	1
e7	00:15	00:15	1
e8	00:20	00:20	1
e9	00:20	00:25	2
e10	00:25	00:25	1

FIG. 28


2800
2810
2820
2830
2842
2844
2846
2840
2848
2850
2852
2862
2864
2866
2860
2868
2870
2872
2882
2884
2886
2880
2888
2890
2892

node	id	time stamp	update_timestamp						active_count						disctence					
			(B)	(C)	(D)	(E)	(F)	(G)	(B)	(C)	(D)	(E)	(F)	(G)	(B)	(C)	(D)	(E)	(F)	(G)
EVENT	0	00:00	00:00	00:05	--	00:15	--	--	0	3	3	4	4	4	−1	0	−1	0.5	−1	2.5
PROJECT	1	00:00	00:00	--	--	--	00:20	00:25	0	0	0	0	2	3	−1	−1	−1	−1	0	0.5
DOCUMENT	2	00:00	00:00	--	00:10	00:10	--	--	0	0	3	3	3	3	−1	−1	0	2	−1	2
Kick off	3	00:05	none	00:05	--	00:15	--	--	0	1	1	4	4	4	−1	1	−1	0	−1	2
WEEKLY REPORT MEETING	4	00:05	none	00:05	--	--	--	--	0	1	1	1	1	1	−1	1	−1	1.5	−1	3.5
REGULAR MEETING	5	00:05	none	00:05	--	--	--	--	0	1	1	1	1	1	−1	1	−1	1.5	−1	3.5
STRATEGY REPORT	6	00:10	none	none	00:10	00:15	--	00:25	0	0	1	2	2	3	−1	−1	1	1	−1	1
report	7	00:10	none	none	00:10	00:15	--	--	0	0	1	2	2	2	−1	−1	1	1	−1	3
WEEKLY REPORT	8	00:10	none	none	00:10	--	--	--	0	0	1	1	1	1	−1	−1	1	3	−1	3
T1	9	00:20	none	none	none	none	00:20	00:25	0	0	0	0	1	1	−1	−1	−1	−1	1	1.5
T2	10	00:20	none	none	none	none	00:20	--	0	0	0	0	1	3	−1	−1	−1	−1	1	0

FIG. 29

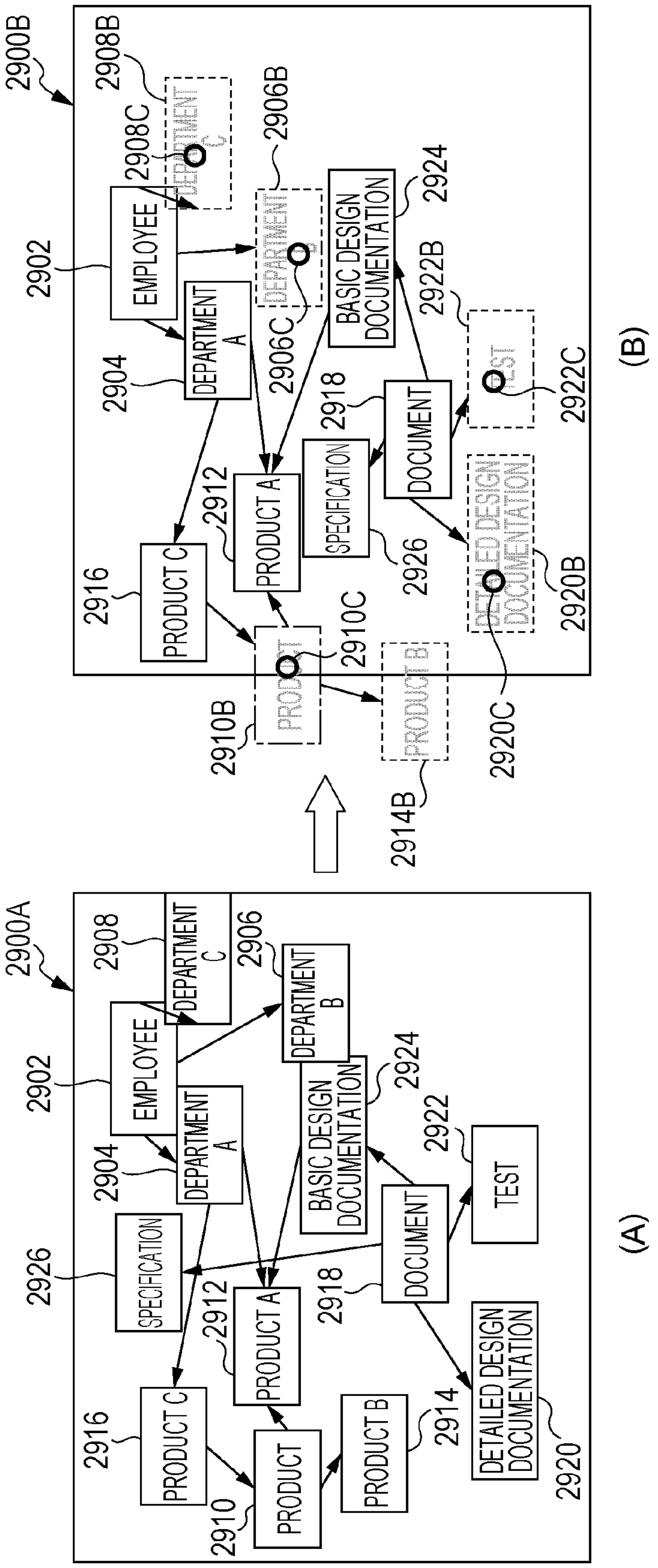
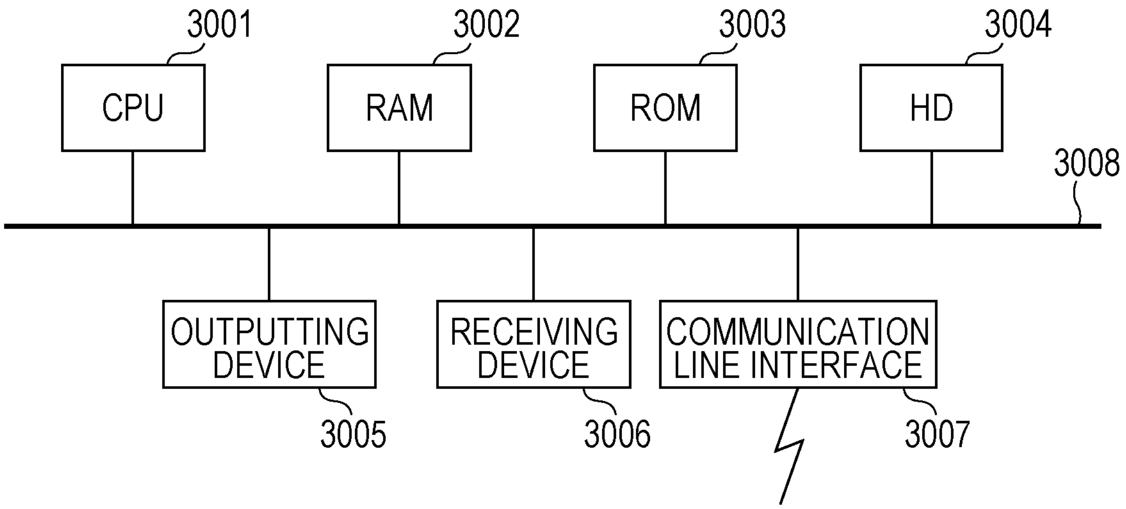

2900A
2902
EMPLOYEE
2904
DEPARTMENT A
2906
DEPARTMENT B
2908
DEPARTMENT C
2910
PRODUCT
2912
PRODUCT A
2914
PRODUCT B
2916
PRODUCT C
2918
DOCUMENT
2920
DETAILED DESIGN DOCUMENTATION
2922
TEST
2924
BASIC DESIGN DOCUMENTATION
2926
SPECIFICATION
(A)
2900B
2902
EMPLOYEE
2904
DEPARTMENT A
2906B
2906C
DEPARTMENT B
2908B
2908C
DEPARTMENT C
2910B
2910C
PRODUCT
2912
PRODUCT A
2914B
PRODUCT B
2916
PRODUCT C
2918
DOCUMENT
2920B
2920C
DETAILED DESIGN DOCUMENTATION
2922B
2922C
TEST
2924
BASIC DESIGN DOCUMENTATION
2926
SPECIFICATION
(B)

FIG. 30


3001
CPU
3002
RAM
3003
ROM
3004
HD
3008
OUTPUTTING DEVICE
3005
RECEIVING DEVICE
3006
COMMUNICATION LINE INTERFACE
3007

INFORMATION PROCESSING APPARATUS, INFORMATION PROCESSING METHOD, AND NON-TRANSITORY COMPUTER READABLE MEDIUM FOR PRESENTING ASSOCIATED INFORMATION UPON SELECTION OF INFORMATION

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based on and claims priority under 35 USC 119 from Japanese Patent Application No. 2011-205991 filed Sep. 21, 2011.

BACKGROUND

(i) Technical Field

The present invention relates to an information processing apparatus, an information processing method, and a non-transitory computer readable medium.

(ii) Related Art

Techniques relating to information search are available.

SUMMARY

According to an aspect of the invention, there is provided an information processing apparatus including a presenting unit, an information extracting unit, a characteristics extracting unit, and a limiting unit. The presenting unit presents information. The information extracting unit extracts, in a case where the information presented by the presenting unit is selected, information associated with the selected information from a storing unit that stores plural pieces of information and association between the plural pieces of information. The characteristics extracting unit extracts characteristics relating to the plural pieces of information and the association between the plural pieces of information. The limiting unit limits, in a case where the presenting unit presents the information extracted by the information extracting unit and the number of pieces of information to be presented is greater than or equal to or greater than a predetermined number, information to be presented on the basis of the characteristics extracted by the characteristics extracting unit.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the present invention will be described in detail based on the following figures, wherein:

FIG. **1** is a schematic diagram illustrating an example of the module configuration according to an exemplary embodiment;

FIG. **2** is a flowchart illustrating an example of a process according to an exemplary embodiment;

FIG. **3** is a flowchart illustrating an example of a process according to an exemplary embodiment;

FIG. **4** is a flowchart illustrating an example of a process according to an exemplary embodiment;

FIG. **5** is an explanatory diagram illustrating an example of the data structure of a document management data table;

FIG. **6** is an explanatory diagram illustrating an example of the association between plural pieces of metadata;

FIG. **7** is an explanatory diagram illustrating an example of the data structure of an event metadata registration table;

FIG. **8** is an explanatory diagram illustrating an example of the data structure of a document metadata registration table;

FIG. **9** is an explanatory diagram illustrating an example of the data structure of a project metadata registration table;

FIG. **10** is an explanatory diagram illustrating an example of the transition of presentation of metadata;

FIG. **11** is an explanatory diagram illustrating an example of a display screen;

FIG. **12** is an explanatory diagram illustrating an example of the data structure of a node data table;

FIG. **13** is an explanatory diagram illustrating an example of a display screen;

FIG. **14** is an explanatory diagram illustrating an example of the data structure of a node data table;

FIG. **15** is an explanatory diagram illustrating an example of the data structure of an edge data table;

FIG. **16** is an explanatory diagram illustrating an example of a display screen;

FIG. **17** is an explanatory diagram illustrating an example of the data structure of a node data table;

FIG. **18** is an explanatory diagram illustrating an example of the data structure of an edge data table;

FIG. **19** is an explanatory diagram illustrating an example of a display screen;

FIG. **20** is an explanatory diagram illustrating an example of the data structure of a node data table;

FIG. **21** is an explanatory diagram illustrating an example of the data structure of an edge data table;

FIG. **22** is an explanatory diagram illustrating an example of a display screen;

FIG. **23** is an explanatory diagram illustrating an example of the data structure of a node data table;

FIG. **24** is an explanatory diagram illustrating an example of the data structure of an edge data table;

FIG. **25** is an explanatory diagram illustrating an example of a display screen;

FIG. **26** is an explanatory diagram illustrating an example of the data structure of a node data table;

FIG. **27** is an explanatory diagram illustrating an example of the data structure of an edge data table;

FIG. **28** is an explanatory diagram illustrating an example of the transition of node data;

FIG. **29** is an explanatory diagram illustrating examples of a presented screen; and

FIG. **30** is a block diagram illustrating an example of the hardware configuration of a computer implementing an exemplary embodiment.

DETAILED DESCRIPTION

Hereinafter, exemplary embodiments of the invention will be explained below with reference to the drawings.

FIG. **1** is a schematic diagram illustrating an example of the module configuration according to an exemplary embodiment.

The term "module" generally represents a component such as software (a computer program), hardware, or the like, which can be logically separated. Thus, modules in exemplary embodiments represent modules in a hardware configuration as well as modules in a computer program. Therefore, the exemplary embodiments also provide explanations of computer programs for causing the components to function as modules (including a program causing a computer to execute various procedures, a program causing a computer to function as various units, and a program causing a computer to implement various functions), systems, and methods. For the sake of a clear explanation, the terms "store" and "cause something to store" and other equivalent expressions are used. In a case where an exemplary embodiment concerns a computer program, these terms and expressions mean "causing a storing device to store" or "controlling a storing device to store".

In addition, a module may correspond to a function in a one-to-one relationship. However, for implementation, a single module may be implemented by a single program, plural modules may be implemented by a single program, or a single module may be implemented by plural programs. Furthermore, plural modules may be executed by a single computer or a single module may be executed by plural computers in a distributed or parallel environment. One module may include another module. Hereinafter, the term "connection" means logical connection (exchange of data, instruction, cross-reference between data, and the like) as well as physical connection. The term "predetermined" means set before a target process is performed. Being "predetermined" means not only being set before processing in an exemplary embodiment starts but also being set even after the processing in the exemplary embodiment starts, in accordance with the condition and state at that time or in accordance with the condition and state of a period until that time, as long as before the target process is performed.

A "system" or an "apparatus" may be implemented by a single computer, hardware, apparatus, or the like as well as by plural computers, hardware, apparatuses, or the like connected using a communication unit such as a network (including communication connection in a one-to-one correspondence). The term "apparatus" is used as a synonym for the term "system". Obviously, the term "system" does not include merely a social "mechanism" (social system), which is an artificial arrangement.

For each process in a module or for individual processes in a module performing plural processes, target information is read from a storing device and the result of the process is written to the storing device after the process is performed. Thus, the explanation of reading from the storing device before the process is performed or the explanation of writing to the storing device after the process is performed may be omitted. The storing device may be a hard disk, a random-access memory (RAM), an external storage medium, a storing device using a communication line, a register inside a central processing unit (CPU), or the like. In addition, the description meaning that "in the case of A, B is performed" means that "it is determined whether it is A, and if it is determined that it is A, B is performed". However, this is not applied to a case where it is not necessary to make a determination as to whether it is A.

An information processing apparatus according to an exemplary embodiment presents plural pieces of metadata and the association between the plural pieces of metadata. As illustrated in the example of FIG. **1**, the information processing apparatus includes a document DB **100**, a data receiving module **102**, a metadata DB **108**, a metadata processing module **110**, a metadata searching module **120**, a metadata displaying module **122**, a metadata-corresponding document searching module **128**, a metadata-corresponding document outputting module **130**, and a searching/outputting module **132**.

The data receiving module **102** includes a document uploading module **104** and a metadata receiving module **106**.

The document uploading module **104** is connected to the document DB **100**. The document uploading module **104** causes the document DB **100** to store a document (electronic document).

The metadata receiving module **106** is connected to the metadata DB **108**. The metadata receiving module **106** receives metadata, and causes the metadata DB **108** to store the metadata. In this exemplary embodiment, the metadata is information to be presented. When the document uploading module **104** causes the document DB **100** to store a document, the metadata receiving module **106** may register metadata of the document into the metadata DB **108**. The metadata may be information irrelevant to a document (for example, associated information such as an event, a project, or the like), as well as the name, attribute, and the like of the document. Furthermore, the metadata receiving module **106** may generate metadata on the basis of a document stored in the document DB **100**, for example, by using the technique disclosed in Japanese Unexamined Patent Application Publication No. 2000-010996.

The document DB **100** is connected to the document uploading module **104** and the metadata-corresponding document outputting module **130**. The document DB **100** is a database that stores a document.

The metadata DB **108** is connected to the metadata receiving module **106**, a metadata extracting module **112**, a metadata structure processing module **114**, a graph generating module **116**, a metadata significance calculating module **118**, a metadata searching module **120**, and a metadata presenting module **126**. The metadata DB **108** is a database that stores plural pieces of metadata and the association between the plural pieces of metadata.

The metadata to be stored in the metadata DB **108** includes, for example, an event metadata registration table **700**, a document metadata registration table **800**, and a project metadata registration table **900**. FIGS. **7**, **8**, and **9** are explanatory diagrams illustrating examples of the data structures of the event metadata registration table **700**, the document metadata registration table **800**, and the project metadata registration table **900**, respectively. The event metadata registration table **700** contains a metadata name field **710** and a metadata value field **720**. The metadata name field **710** stores the names of attributes. The metadata value field **720** stores the values of the individual attributes. The document metadata registration table **800** contains a metadata name field and a metadata value field **820**. The metadata name field **810** stores the names of attributes. The metadata value field **820** stores the values of the individual attributes. The project metadata registration table **900** contains a metadata name field **910** and a metadata value field **920**. The metadata name field **910** stores the names of attributes. The metadata value field **920** stores the values of the individual attributes.

For example, information in the metadata value field **720** for "title" in the metadata name field **710** may be extracted as metadata to be presented. The same applies to the document metadata registration table **800** and the project metadata registration table **900**.

Directory structures (tree structures) illustrated in FIG. **6** are examples of the association between plural pieces of metadata stored in the metadata DB **108**. These examples illustrate three directory structures of an event, a document, and a project. In the first directory structure, a kick off **612**, a weekly report meeting **618**, and a regular meeting **620** are provided at a level lower than an event **610**. A strategy report **614** and a report **616** are provided at a level lower than the kick off **612**. In the second directory structure, a weekly report **632**, the strategy report **614**, and the report **616** are provided at a level lower than a document **630**. A T**2** Prj **634** and the kick off **612** are provided at a level lower than the strategy report **614**. In the third directory structure, a T**1** Prj **652** and the T**2** Prj **634** are provided at a level lower than a project **650**. The same elements are denoted by the same reference numerals. For example, the strategy report **614** provided at a level lower than the kick off **612** in the first directory structure, which is located on the left of FIG. **6**, is the same as the strategy report **614** provided at a level lower than the document **630** in the second directory structure, which is located in the middle of FIG. **6**.

Associated metadata is metadata having a parent relationship or a child relationship with target metadata in a directory structure. In these examples, a parent in a directory structure represents only metadata right above target metadata, and a child in a directory structure represents only metadata right below target metadata. However, this is merely an example. Associated metadata may include a brother (metadata having the same parent), a parent's parent, a child's child, and the like. For example, metadata associated with the event **610** includes the kick off **612**, the weekly report meeting **618**, and the regular meeting **620**. For example, metadata associated with the kick off **612** includes the event **610**, the strategy report **614**, and the report **616**.

The metadata DB **108** stores a document management table **500** in such a manner that metadata is searched for using a keyword. FIG. **5** is an explanatory diagram illustrating an example of the data structure of the document management table **500**. The document management table **500** contains a document ID field **510**, a keyword field **520**, a metadata field **530**, and a storage position field **540**.

In this exemplary embodiment, a document ID serving as information uniquely identifying a document is stored in the document ID field **510**.

A keyword assigned to the document is stored in the keyword field **520**. This keyword is used for search. Plural keywords may be stored in the keyword field **520**.

Metadata of the document is stored in the metadata field **530**. The metadata is to be presented. For example, the metadata may include the document name, attribute, and the like of the document.

The position in the document DB **100** at which the document is stored is stored in the storage position field **540**. For example, a document, URL, and the like are stored in the storage position field **540**.

Although the example in which information on metadata etc. relevant to a document is stored has been explained above, information irrelevant to a document may be stored.

The metadata processing module **110** includes the metadata extracting module **112**, the metadata structure processing module **114**, the graph generating module **116**, and the metadata significance calculating module **118**.

The metadata extracting module **112** is connected to the metadata DB **108** and the metadata structure processing module **114**. In the case where metadata presented by the metadata presenting module **126** is selected, the metadata extracting module **112** extracts metadata associated with the selected metadata from the metadata DB **108**. For example, selection of information is made in accordance with a selecting operation performed by an operator and detected by a search UI module **124**. Metadata associated with target metadata may be extracted by following the target metadata in the directory structure described above and searching for metadata having a parent or child relationship with the target metadata.

The metadata structure processing module **114** is connected to the metadata DB **108**, the metadata extracting module **112**, and the graph generating module **116**. The metadata structure processing module **114** extracts characteristics relating to metadata or the association between plural pieces of metadata.

For example, the metadata structure processing module **114** may extract, as characteristics relating to metadata, the time at which the metadata was selected or the time at which metadata associated with the metadata was selected. Here, "the time at which metadata (A) associated with the metadata (B) was selected" represents the time at which information (B) was presented in accordance with selection of information (A).

Furthermore, for example, the metadata structure processing module **114** may extract, as characteristics relating to metadata, in the case where the metadata is selected, the number of pieces of metadata associated with the metadata or the number of times metadata associated with the metadata has been selected. Here, "in the case where the metadata (A) is selected, the number of pieces of metadata (B) associated with the metadata" represents the number of pieces of metadata (B) presented in accordance with selection of the metadata (A).

Furthermore, for example, the metadata structure processing module **114** may extract, as characteristics relating to the association between plural pieces of metadata, a value based on the number of times one of selected metadata and target metadata that are associated with each other in a path has been selected.

The graph generating module **116** is connected to the metadata DB **108** and the metadata structure processing module **114**. The graph generating module **116** generates a graph of the association between plural pieces of metadata extracted by the metadata extracting module **112**. For example, the graph generating module **116** generates a directed acyclic graph (DAG) or the like. A graph includes nodes and an edge (also called an arc or the like) indicating the association between the nodes. Metadata corresponds to a node. In the case where presented metadata (A) is selected and metadata (B) associated with the metadata (A) is extracted, an edge is generated between the two pieces of metadata (nodes). An edge has a direction. In the example described above, an edge directed from the metadata (A) to the metadata (B) is generated. The graph generated here might not be the same as the graph that is presented on a search UI displaying screen **134** by the metadata presenting module **126**. That is, although the graph that is presented on the search UI displaying screen **134** by the metadata presenting module **126** has a limited number of pieces of metadata to be presented, the graph generated by the graph generating module **116** does not have a limited number of pieces of metadata since the graph is generated in accordance with metadata extracted by the metadata extracting module **112** (metadata associated with the selected metadata) and the association between plural pieces of metadata.

The metadata significance calculating module **118** is connected to the metadata DB **108**. In the case where the metadata presenting module **126** presents metadata extracted by the metadata extracting module **112** and the number of pieces of metadata to be presented is greater than or equal to or greater than a predetermined number, the metadata significance calculating module **118** limits metadata to be presented on the basis of the characteristics extracted by the metadata structure processing module **114**. That is, the number of pieces of metadata presented on the search UI displaying screen **134** is equal to or smaller than the predetermined number.

In addition, for example, the metadata significance calculating module **118** may limit metadata to be presented by selecting metadata to be presented by the metadata presenting module **126** or selecting, in a case where metadata has already been presented by the metadata presenting module **126**, information for which presentation by the metadata presenting module **126** is to be deleted, in accordance with comparison between a value based on the characteristics extracted by the metadata structure processing module **114** and a predetermined threshold. That is, in the case where the number of pieces of metadata to be newly presented is greater than or equal to or greater than the predetermined number, the already presented metadata is deleted from the search UI displaying screen **134**.

The metadata searching module **120** is connected to the metadata DB **108**, the search UI module **124**, and the metadata-corresponding document searching module **128**. The metadata searching module **120** searches the metadata DB **108** for metadata using a keyword or the like received by the search UI module **124** in accordance with a search operation or the like performed by an operator.

The metadata displaying module **122** includes the search UI module **124**, the metadata presenting module **126**, and the search UI displaying screen **134**.

The search UI module **124** is connected to the metadata searching module **120**, the metadata presenting module **126**, and the search UI displaying screen **134**. The search UI module **124** receives a search operation or the like performed by an operator and transfers a keyword or the like for search to the metadata searching module **120**. The search UI module **124** also detects a selecting operation by an operator for metadata presented on the search UI displaying screen **134**. When detecting a selecting operation, the search UI module **124** transfers the selected metadata to the metadata extracting module **112**.

The metadata presenting module **126** is connected to the metadata DB **108** and the search UI module **124**. The metadata presenting module **126** presents metadata to the search UI displaying screen **134**. The metadata presenting module **126** may also present the association between plural pieces of metadata using an arrow or the like. The metadata presenting module **126** presents metadata for which presentation is limited by the metadata significance calculating module **118**.

The metadata presenting module **126** may also present information (an icon, mark, graphic form, or the like) indicating that metadata for which presentation is deleted was previously presented.

The metadata-corresponding document searching module **128** is connected to the metadata searching module **120** and the metadata-corresponding document outputting module **130**. The metadata-corresponding document searching module **128** searches the document DB **100** for a document associated with metadata. For example, in the case where metadata is the name, attribute, or the like of a document, the metadata-corresponding document searching module **128** searches the document DB **100** for the document. In the case where metadata is information irrelevant to a document, the metadata-corresponding document searching module **128** may present that the metadata is irrelevant to a document or may prepare in advance a table in which the metadata is associated with a document and search for the document corresponding to the metadata on the basis of the table.

The metadata-corresponding document outputting module **130** is connected to the document DB **100**, the metadata-corresponding document searching module **128**, and a document outputting screen **136**. The metadata-corresponding document outputting module **130** extracts a document found by the metadata-corresponding document searching module **128** from the document DB **100** and outputs the extracted document as the document outputting screen **136**.

The searching/outputting module **132** includes the search UI displaying screen **134** and the document outputting screen **136**.

The search UI displaying screen **134** is connected to the search UI module **124** and the document outputting screen **136**. The search UI displaying screen **134** is a screen for receiving a keyword for search and for presenting metadata (including an arrow or the like indicating the association between plural pieces of metadata) or the like serving as a search result. An example of the search UI displaying screen **134** will be described later with reference to FIG. **10** and the like.

The document outputting screen **136** is connected to the metadata-corresponding document outputting module **130** and the search UI displaying screen **134**. The document outputting screen **136** is a screen for presenting a document output by the metadata-corresponding document outputting module **130**.

The search UI displaying screen **134** and the document outputting screen **136** are presented on, for example, a presentation device (a liquid crystal display, a touch panel, or the like) provided in an exemplary embodiment.

FIG. **2** is a flowchart illustrating an example of a process according to an exemplary embodiment.

In step S**202**, the search UI module **124** receives a keyword. FIG. **10** is an explanatory diagram illustrating an example of the transition of presentation of metadata. On a display screen **1000** illustrated in an example of part (A) of FIG. **10**, a keyword receiving region **1010**, a search instructing button **1020**, and a mouse cursor **1030** are presented. In the keyword receiving region **1010**, a keyword used for search is described. When the search instructing button **1020** is selected by the mouse cursor **1030** in accordance with an operation performed by an operator, the search UI module **124** receives a character string inside the keyword receiving region **1010** as a keyword.

In step S**204**, the metadata searching module **120** searches the metadata DB **108** for metadata. For example, the metadata searching module **120** may search the keyword field **520** of the document management table **500** for the keyword received in step S**202** and extract metadata corresponding to the keyword.

In step S**206**, the metadata presenting module **126** presents the found metadata. On the display screen **1000** illustrated in an example of part (B) of FIG. **10**, the event **610**, the document **630**, and the project **650**, which are metadata found in step S**204**, are presented. Arrangement of these metadata may be determined, for example, by equally dividing the display screen **1000** into the number of pieces of metadata to be presented.

In step S**208**, the search UI module **124** determines whether or not to output a document. If it is determined that a document is to be output, the process proceeds to step S**220**. If it is determined that a document is not to be output, the process proceeds to step S**210**. For example, in the case where a document outputting operation has been performed by the operator for a document corresponding to the target metadata, the process proceeds to step S**220**.

In step S**210**, the search UI module **124** receives the selected metadata. For example, in the case where a selecting operation performed by the operator for metadata presented on the search UI displaying screen **134** is detected, the metadata corresponds to the selected metadata.

In step S**212**, the metadata extracting module **112** and the metadata structure processing module **114** acquire associated metadata. The metadata extracting module **112** and the metadata structure processing module **114** acquire metadata associated with the metadata selected in step S**210**.

In step S**214**, the metadata significance calculating module **118** calculates the significance. The calculation of significance will be described later with reference to FIG. **3**.

In step S**216**, the metadata presenting module **126** generates a graph to be presented. Generation of a graph to be presented will be described later with reference to FIG. **4**.

In step S218, the metadata presenting module 126 presents the generated graph. On the display screen 1000 illustrated in the example of part (C) of FIG. 10, the event 610 is selected from the state illustrated in an example of part (B) of FIG. 10, and the kick off 612, the weekly report meeting 618, and the regular meeting 620 are presented as metadata associated with the event 610. In addition, arrows are presented between the event 610 and the kick off 612, between the event 610 and the weekly report meeting 618, and between the event 610 and the regular meeting 620.

In step S220, the metadata-corresponding document searching module 128 extracts the document from the document DB 100.

In step S222, the metadata-corresponding document outputting module 130 outputs the document to the document outputting screen 136.

FIG. 3 is a flowchart illustrating an example of a process (step S214) according to an exemplary embodiment.

In step S302, the metadata extracting module 112 generates or changes node information. The metadata extracting module 112 generates node information corresponding to the found or selected metadata. In the case where node information has already been generated, the metadata extracting module 112 changes the node information corresponding to the metadata. For metadata associated with the selected metadata, the metadata extracting module 112 generates node information corresponding to the associated metadata. In the case where the node information has already been generated, the metadata extracting module 112 changes the node information corresponding to the associated metadata. A node and metadata are associated with each other in a one-to-one relationship. However, in the case where found metadata or presented metadata is selected and metadata associated with the selected metadata is extracted, the extracted metadata is called a node. That is, metadata in the case where a graph structure is generated by a selecting operation is called a node.

For example, node information includes <node_id><timestamp><update_timestamp><active_count><out_edge><in_edge>.

In the node information, <node_id> may uniquely identify the node in this exemplary embodiment. In the node information, <timestamp> indicates the time (here, the time is the combination of year, month, date, hour, minute, second, and a unit of time smaller than a second, and the same applies to the following) at which the node was found or selected. In the node information, <update_timestamp> indicates the latest time at which the node was found or selected. In the node information, <active_count> indicates, in the case where the node is selected, the number of nodes associated with the selected node (that is, the number of nodes that may be displayed by the selection) or the total number of times the node associated with the selected node has been selected. In the node information, <out_edge> indicates an edge ID that uniquely identifies an edge connected to the node and directed from the node to another node. That is, when the node is selected and an associated node is extracted, <out_edge> is generated. In the node information, <in_edge> indicates an edge ID that uniquely identifies an edge connected to the node and directed to the node from another node. That is, when a node associated with the node is selected and the target node is extracted, <in_edge> is generated.

As in a node data table 1200 described later with reference to FIG. 12, node information may include <disctence>.

In step S304, the metadata structure processing module 114 generates or changes edge information. In the case where the association between nodes is newly generated (in the case where a new node is generated or a new edge is generated between existing nodes), the metadata structure processing module 114 generates edge information. In the case where one of two nodes associated with an edge is selected, edge information is changed.

For example, edge information includes <edge_id><active_timestamp><update_active_timestamp><active_count><from><to>.

In the edge information, <edge_id> uniquely identifies the edge in this exemplary embodiment. In the edge information, <active_timestamp> indicates the time at which a node associated with the edge was found or selected. In the edge information, <update_active_timestamp> indicates the latest time at which a node associated with the edge was found or selected. In the edge information, <active_count> indicates the number of times a node associated with the edge has been found or selected. Since an edge is generated when a node is selected, the initial value of <active_count> is "1". In the case where one of two nodes associated with the edge is selected, <active_count> is incremented. In the edge information, <from> is an edge ID that uniquely identifies the source node for the edge. That is, <from> identifies a node found or selected in the case where the edge is generated. In the edge information, <to> indicates an edge ID that uniquely identifies a node to which the edge is directed. That is, <to> indicates a node (extracted node) associated with the found or selected node in the case where the edge is generated.

In step S306, the graph generating module 116 generates a graph structure. For example, the graph generating module 116 generates a graph structure by which a DAG may be generated on the basis of the node information and the edge information.

In step S308, the metadata significance calculating module 118 sorts the <update_timestamp> values in the node information in an ascending order to calculate score 1. That is, the order is defined as score 1.

In step S310, the metadata significance calculating module 118 calculates score 2 on the basis of the <active_count> value in the node information.

In step S312, the metadata significance calculating module 118 calculates score 3 on the basis of the edge weight and the path to the current node. That is, score 3 is calculated on the basis of the number of times one of the selected node and the target node that are associated with each other in a path has been selected. More specifically, an edge of the path between the currently selected node and the node for which the significance is to be calculated is extracted and the reciprocal of <active_count> of the edge is obtained. In the case where plural edges exist as paths, the sum of the reciprocals of <active_count> of individual edges is calculated as score 3.

In step S314, the metadata significance calculating module 118 calculates the significance of the node on the basis of scores 1, 2, and 3. Any one of scores 1, 2, and 3 may be directly used as a significance. Alternatively, the significance may be calculated on the basis of the combination of two or more of scores 1, 2, and 3.

For example, the significance may be calculated as follows:

$$\text{Significance cid}=w1*\text{score }1+w2*\text{score }2+w3*\text{score }3,$$

where "w1", "w2", and "w3" represent predetermined weight coefficients. In the case where a higher value in the significance represents a higher significance (presentation of a node having a higher significance is less likely to be deleted), "w3" represents a negative value. Alternatively, the significance may be calculated as follows:

$$\text{Significance cid}=w1*\text{score }1+w2*\text{score }2+w3/\text{score }3.$$

In step S316, the metadata significance calculating module 118 writes the significance into the metadata DB 108.

In step S318, the metadata extracting module 112 determines whether or not any target metadata exists. If it is determined that any target metadata exists, the process returns to step S302. If it is determined that no target metadata exists, the process is terminated (step S399).

FIG. 4 is a flowchart illustrating an example of a process (step S216) according to an exemplary embodiment.

In step S402, the metadata extracting module 112 and the metadata structure processing module 114 acquire target metadata. For example, metadata in a graph generated by the graph generating module 116 may be extracted. The number of pieces of metadata extracted is the maximum number of pieces of metadata that may be presented.

In step S404, the metadata presenting module 126 determines whether the number of pieces of target metadata is greater than the maximum number of pieces of metadata that can be presented. If it is determined that the number of pieces of target metadata is greater than the maximum number of pieces of metadata that can be presented, the process proceeds to step S406. If it is determined that the number of pieces of target metadata is smaller than or equal to the maximum number of pieces of metadata than can be presented, the process proceeds to step S408. The maximum number of pieces of metadata that can be presented is a predetermined number.

In step S406, the metadata presenting module 126 selects, on the basis of the significance of metadata, a number of pieces of metadata smaller than or equal to the maximum number of pieces of metadata that can be presented as metadata to be presented. For example, sorting may be performed in a descending order on the basis of the significance of metadata, and the maximum number of pieces of metadata that can be presented may be selected from the metadata having the highest significance. Obviously, nodes for which selection is to be deleted may be selected in a similar manner.

In step S408, the metadata presenting module 126 generates a graph to be presented. Information indicating that information for which presentation is deleted was previously presented may be presented.

FIG. 10 is an explanatory diagram illustrating an example of the transition of presentation of metadata.

The display screen 1000 illustrated in the example of part (A) of FIG. 10 has been explained above in step S202.

The display screen 1000 illustrated in the example of part (B) of FIG. 10 has been explained above in step S206. The display screen 1000 illustrated in the example of part (C) of FIG. 10 has been explained above in step S218. The maximum number of pieces of metadata that can be presented is set to 10.

In the display screen 1000 illustrated in an example of part (D) of FIG. 10, the document 630 is selected from the state illustrated in the example of part (C) of FIG. 10, and the strategy report 614, the report 616, and the weekly report 632 are presented as metadata associated with the document 630. Furthermore, arrows are presented between the document 630 and the strategy report 614, between the document 630 and the report 616, and between the document 630 and the weekly report 632.

In the display screen 1000 illustrated in an example of part (E) of FIG. 10, the kick off 612 is selected from the state illustrated in the example of part (D) of FIG. 10. No metadata is newly presented as metadata associated with the kick off 612. Arrows are presented between the kick off 612 and the strategy report 614, which has already been presented, and between the kick off 612 and the report 616, which has already been presented. An arrow in the opposite direction is also presented between the kick off 612 and the event 610.

In the display screen 1000 illustrated in an example of part (F) of FIG. 10, the project 650 is selected from the state illustrated in the example of part (E) of FIG. 10. The T1 Prj 652 and the T2 Prj 634 are intended to be presented as metadata associated with the project 650. However, the number of pieces of metadata to be presented is 11, which exceeds the maximum number "10" of pieces of metadata that can be presented. Thus, metadata is deleted from the plural pieces of metadata to be presented on the basis of the significance cid, so that the number of pieces of metadata to be presented does not exceed the maximum number of pieces of metadata that can be presented. More specifically, metadata is deleted as described below with reference to FIGS. 22 to 24.

In the display screen 1000 illustrated in an example of part (G) of FIG. 10, the T2 Prj 634 is selected from the state illustrated in the example of part (F) of FIG. 10. No metadata is newly presented as metadata associated with the T2 Prj 634. An arrow is presented between the T2 Prj 634 and the strategy report 614, which has already been presented. An arrow in the opposite direction is also presented between the T2 Prj 634 and the project 650. However, the number of pieces of metadata to be presented (the number of nodes in a graph generated by the graph generating module 116) is 11, which exceeds the maximum number "10" of pieces of metadata that can be presented. Thus, presentation of the weekly report meeting 618 and the regular meeting 620 are deleted. Obviously, presentation of arrows between the event 610 and the weekly report meeting 618 and between the event 610 and the regular meeting 620 are also deleted. Then, the T1 Prj 652 and the T2 Prj 634 are presented. Furthermore, arrows are presented between the project 650 and the T1 Prj 652 and between the project 650 and the T2 Prj 634.

FIG. 11 is an explanatory diagram illustrating the example of the display screen 1000 in the state illustrated in part (B) of FIG. 10. The node data table 1200 in this state will be explained with reference to FIG. 12. The node data table 1200 contains a node field 1210, an id field 1220, a timestamp field 1230, an update_timestamp field 1240, an active_count field 1250, an out_edge field 1260, an in_edge field 1270, and a distance field 1280. The node field 1210 stores the name of node information (metadata to be presented). The id field 1220 stores <node_id> of the node information. The timestamp field 1230 stores <timestamp> of the node information. The update_timestamp field 1240 stores <update_timestamp> of the node information. The active_count field 1250 stores <active_count> of the node information. The out_edge field 1260 stores <out_edge> of the node information. The in_edge field 1270 stores <in_edge> of the node information. The disctence field 1280 stores the value corresponding to score 3. Here, only found metadata is presented, and edge information does not exist. Thus, "−1" is stored as an initial value. In the case where a path exists between the selected node and this node (a node in each row in the node data table 1200), the value other than "−1" is stored.

The node data table 1200 is generated and changed by the metadata structure processing module 114 and the metadata significance calculating module 118.

FIG. 13 is an explanatory diagram illustrating an example of the display screen 1000 in the state illustrated in part (C) of FIG. 10. The node data table 1200 in this state will be explained with reference to FIG. 14. In addition, an edge data table 1500 in this state will be explained with reference to FIG. 15.

The node data table 1200 illustrated in the example of FIG. 14 differs from the node data table 1200 illustrated in the example of FIG. 12 in that rows of a "kick off" (id=3), a "weekly report meeting" (id=4), and a "regular meeting" (id=5) are added to the node field **1210**, the timestamp field **1230** and the update_timestamp field **1240** store "00:05", the active_count field **1250** stores "1", the out_edge field **1260** stores "null", the in_edge field **1270** stores "e**0**", "e**1**", and "e**2**", and the disctence field **1280** stores "1".

The value "1" in the active_count field **1250** represents the number of times a node (the event **610**) associated with the node was selected at that time.

The value "1" in the disctence field **1280** represents the result obtained by adding the reciprocals of individual edges of paths in an active_count field **1540** in the edge data table **1500**. More specifically, for example, only the edge e**0** exists as the path from the kick off **612** to the event **610**, the active_count field **1540** for the edge e**0** is "1", and the reciprocal of "1" is "1".

In the row of the "event" (id=0) in the node field **1210**, the value of the update_timestamp field **1240** is changed to "00:05", the value of the active_count field **1250** is changed to "3", the value of the out_edge field **1260** is changed to "e**0**", "e**1**", and "e**2**", and the value of the disctence field **1280** is changed to "0".

The changed value "3" in the active_count field **1250** represents, in the case where the node is selected, the number of nodes (the kick off **612**, the weekly report meeting **618**, and the regular meeting **620**) associated with the node.

The value "0" in the disctence field **1280** represents that the node is selected.

FIG. **15** is an explanatory diagram illustrating an example of the data structure of the edge data table **1500**. The edge data table **1500** contains an edge id field **1510**, an active-timestamp field **1520**, an update_active_timestamp field **1530**, and an active_count field **1540**. The edge id field **1510** stores <node_id> of the edge information. The active-timestamp field **1520** stores <active_timestamp> of the edge information. The update_active_timestamp field **1530** stores <update_active_timestamp> of the edge information. The active_count field **1540** stores <active_count> of the edge information.

Here, since an edge is generated in the case where the node of the event **610** is selected, the active_count field **1540** stores "1".

FIG. **16** is an explanatory diagram illustrating an example of the display screen **1000** in the state illustrated in part (D) of FIG. **10**. The node data table **1200** in this state will be explained with reference to FIG. **17**. In addition, the edge data table **1500** in this state will be explained with reference to FIG. **18**.

The node data table **1200** illustrated in the example of FIG. **17** differs from the node data table **1200** illustrated in the example of FIG. **14** in that rows of a "strategy report" (id=6), a "report" (id=7), and a "weekly report" (id=8) are added to the node field **1210**, the timestamp field **1230** and the update_timestamp field **1240** store "00:10", the active_count field **1250** stores "1", the out_edge field **1260** stores "null", the in_edge field **1270** stores "e**3**", "e**4**", and "e**5**", and the disctence field **1280** stores "1". The value "1" in the disctence field **1280** represents the result obtained by adding the reciprocals of individual edges of paths in the active_count field **1540** of the edge data table **1500**. More specifically, for example, only the edge e**3** exists as the path from the strategy report **614** to the document **630**, the value of the active_count field **1540** for the edge e**3** is "1", and the reciprocal of "1" is "1".

In the row of the "event" (id=0) in the node field **1210**, the value of the disctence field **1280** is changed to "−1". In the row of a "document" (id=2) in the node field **1210**, the value of the update_timestamp field **1240** is changed to "00:10", the value of the active_count field **1250** is changed to "3", the value of the out_edge field **1260** is changed to "e**3**", "e**4**", and "e**5**", and the value of the disctence field **1280** is changed to "0". The changed value "3" in the active_count field **1250** represents, in the case where the node is selected, the number of nodes (the strategy report **614**, the report **616**, and the weekly report **632**) associated with the node. The changed value "0" in the disctence field **1280** represents that the currently selected node is the document **630**.

In the rows of the "kick off" (id=3), the "weekly report meeting" (id=4), and the "regular meeting" (id=5), the value of the disctence field **1280** is changed to "−1". The changed value "−1" in the disctence field **1280** represents that no path exists between the currently selected document **630** and the node.

The edge data table **1500** illustrated in the example of FIG. **18** differs from the edge data table **1500** illustrated in the example of FIG. **15** in that rows of "e**3**", "e**4**", and "e**5**" are added to the edge id field **1510**, the active-timestamp field **1520** and the update_active_timestamp field **1530** store "00:10", and the active_count field **1540** stores "1".

FIG. **19** is an explanatory diagram illustrating an example of the display screen **1000** in the state illustrated in part (E) of FIG. **10**. The node data table **1200** in this state will be explained with reference to FIG. **20**. In addition, the edge data table **1500** in this state will be explained with reference to FIG. **21**.

The node data table **1200** illustrated in the example of FIG. **20** differs from the node data table **1200** illustrated in the example of FIG. **17** in that, in the row of the "event" (id=0) in the node field **1210**, the value of the update_timestamp field **1240** is changed to "00:15", the value of the active_count field **1250** is changed to "4", and the value of the disctence field **1280** is changed to "0.5". The changed value "4" in the active_count field **1250** represents that since the kick off **612** associated with the event **610** is selected, "1" is added to the value "3" of the active_count field **1250** in the node data table **1200** illustrated in the example of FIG. **17**, which is in the previous state. The changed value "0.5" in the disctence field **1280** represents that the reciprocal of "2", which is the value of the path "e**0**" from the currently selected kick off **612** to the event **610** in the active_count field **1540**, is "½".

Furthermore, in the row of the "document" (id=2), the value of the disctence field **1280** is changed to "2". The changed value "2" in the disctence field **1280** represents that since the values of the paths (e**6** and e**3** or e**7** and e**4**) from the currently selected kick off **612** to the document **630** in the active_count field **1540** are each "1" and the reciprocal of "1" is "1", the sum of "1" and "1" is "2".

Furthermore, in the row of the "kick off" (id=3), the value of the update_timestamp field **1240** is changed to "00:15", the value of the active_count field **1250** is changed to "4", the value of the out_edge field **1260** is changed to "e**6** e**7**", and the value of the disctence field **1280** is changed to "0".

Furthermore, in the rows of the "weekly report meeting" (id=4) and the "regular meeting" (id=5), the value of the disctence field **1280** is changed to "1.5". The changed value "1.5" represents that, for example, since the values of the paths (e**0** and e**1**) from the currently selected kick off **612** to the weekly report meeting **618** in the active_count field **1540** are "2" and "1" and the reciprocals of "2" and "1" are "½" and "1", the sum of "½" and "1" is "1.5".

Furthermore, in the row of the "strategy report" (id=6), the value of the update_timestamp field **1240** is changed to "00:15", the value of the active_count field **1250** is changed to "2", and the value of the in_edge field **1270** is changed to "e**3** e**6**".

Furthermore, in the row of the "report" (id=7), the value of the update_timestamp field **1240** is changed to "00:15", the value of the active_count field **1250** is changed to "2", and the value of the in_edge field **1270** is changed to "e**4** e**7**".

Furthermore, in the row of the "weekly report" (id=8), the value of the disctence field **1280** is changed to "3". The changed value "3" in the disctence field **1280** represents that since the values of the paths (e**6**, e**3**, and e**5** or e**7**, e**4**, and e**5**) from the currently selected kick off **612** to the weekly report **632** in the active_count field **1540** are each "1" and the reciprocal of "1" is "1", the sum of "1", "1", and "1" is "3".

The edge data table **1500** illustrated in the example of FIG. **21** differs from the edge data table **1500** illustrated in the example of FIG. **18** in that rows of "e**6**" and "e**7**" are added to the edge id field **1510**, the active-timestamp field **1520** and the update_active_timestamp field **1530** store "00:15", and the active_count field **1540** stores "1".

In the row of "e**0**" in the edge id field **1510**, the value of the update_active_timestamp field **1530** is changed to "00:15", and the value of the active_count field **1540** is changed to "2". The changed value "2" in the active_count field **1540** represents that since the kick off **612** of the node associated with the edge e**0** is selected, "1" is added to "1" in the active_count field **1540** of the edge data table **1500** illustrated in the example of FIG. **18**, which is in the previous state.

FIG. **22** is an explanatory diagram illustrating an example of the display screen **1000** in the state of part (F) of FIG. **10**. The node data table **1200** in this state will be explained with reference to FIG. **23**. In addition, the edge data table **1500** in this state will be explained with reference to FIG. **24**.

The node data table **1200** illustrated in the example of FIG. **23** differs from the node data table **1200** illustrated in the example of FIG. **20** in that rows of a "T**1**" (id=9) and a "T**2**" (id=10) are added to the node field **1210**, the timestamp field **1230** stores "00:20", the update_timestamp field **1240** stores "00:20" for the "T**1**" and "00:25" for the "T**2**", the active_count field **1250** stores "1", the out_edge field **1260** stores "null", the in_edge field **1270** stores "e**8**" for the "T**1**" and "e**9**" for the "T**2**", and the disctence field **1280** stores "1".

In the row of the "event" (id=0) in the node field **1210**, the value of the disctence field **1280** is changed to "−1". In the row of the "project" (id=1), the value of the update_timestamp field **1240** is changed to "00:20", the value of the active_count field **1250** is changed to "2", the value of the out_edge field **1260** is changed to "e**8** e**9**", and the value of the disctence field **1280** is changed to "0".

Furthermore, in the rows of the "document" (id=2), the "kick off" (id=3), the "weekly report meeting" (id=4), the "regular meeting" (id=5), the "strategy report" (id=6), the "report" (id=7), and the "weekly report" (id=8), the value of the disctence field **1280** is changed to "−1".

The edge data table **1500** illustrated in the example of FIG. **24** differs from the edge data table **1500** illustrated in the example of FIG. **21** in that rows of "e**8**" and "e**9**" are added to the edge id field **1510**, the active-timestamp field **1520** and the update_active_timestamp field **1530** store "00:20", and the active_count field **1540** stores "1".

At this point in time, the number of pieces of metadata to be presented is "11", which exceeds the maximum number "10" of pieces of metadata that can be presented. Thus, metadata having a low significance cid is deleted by calculating the significance cid on the basis of the weight coefficients w**1**, w**2**, and w**3**.

FIG. **25** is an explanatory diagram illustrating an example of the display screen **1000** in the state of part (G) of FIG. **10**. The node data table **1200** in this state will be explained with reference to FIG. **26**. In addition, the edge data table **1500** in this state will be explained with reference to FIG. **27**.

The node data table **1200** illustrated in the example of FIG. **26** differs from the node data table **1200** illustrated in the example of FIG. **23** in that, in the row of the "event" (id=0) in the node field **1210**, the value of the disctence field **1280** is changed to "2.5".

Furthermore, in the row of the "project" (id=1), the value of the update_timestamp field **1240** is changed to "00:25", the value of the active_count field **1250** is changed to "3", and the value of the disctence field **1280** is changed to "0.5".

Furthermore, in the rows of the "document" (id=2) and the "kick off" (id=3), the value of the disctence field **1280** is changed to "2".

Furthermore, in the rows of the "weekly report meeting" (id=4) and the "regular meeting" (id=5), the value of the disctence field **1280** is changed to "3.5".

Furthermore, in the row of the "strategy report" (id=6), the value of the update_timestamp field **1240** is changed to "00:25", the value of the active_count field **1250** is changed to "3", and the value of the disctence field **1280** is changed to "1".

Furthermore, in the rows of the "report" (id=7) and the "weekly report" (id=8), the value of the disctence field **1280** is changed to "3".

Furthermore, in the row of the "T**1**" (id=9), the value of the disctence field **1280** is changed to "1.5". In the row of the "T**2**" (id=10), the value of the active_count field **1250** is changed to "3", the value of the out_edge field **1260** is changed to "e**10**", and the value of the disctence field **1280** is changed to "0".

The edge data table **1500** illustrated in the example of FIG. **27** differs from the edge data table **1500** illustrated in the example of FIG. **24** in that a row of "e**10**" is added to the edge id field **1510**, the active-timestamp field **1520** and the update_active_timestamp field **1530** store "00:25", and the active_count field **1540** stores "1".

In the row of "e**9**" in the edge id field **1510**, the value of the update_active_timestamp field **1530** is changed to "00:25", and the value of the active_count field **1540** is changed to "2".

At this point in time, the number of pieces of metadata to be presented (the number of nodes in a graph generated by the graph generating module **116**) is 11, which exceeds the maximum number "10" of pieces of metadata that can be presented. The weekly report meeting **618** and the regular meeting **620** exhibit a low Score 1 (the ascending sorting order of the update_timestamp field **1240**), the weekly report meeting **618** and the regular meeting **620** exhibit a low score 2 (the active_count field **1250**), and the weekly report meeting **618** and the regular meeting **620** exhibit a high score 3 (the disctence field **1280**) (in the case where score 3 is high, presentation of the node is more likely to be deleted). Thus, at this point in time, presentation of the weekly report meeting **618** and the regular meeting **620** is deleted.

Furthermore, as illustrated in an example of FIG. **25**, the weekly report meeting **618** and the regular meeting **620** may be presented in a light color or a weekly report meeting (a mark indicating the recent deletion) **1092** and a regular meeting (a mark indicating the recent deletion) **1094** may be presented.

FIG. **28** is an explanatory diagram illustrating an example of node data transition **2800**. The node data transition **2800** represents time-series transition of the node data table **1200**. The node data transition **2800** contains a node field **2810**, an id field **2820**, a timestamp field **2830**, an update_timestamp field **2840**, an active_count field **2860**, and a disctence field **2880**. The update_timestamp field **2840** includes a (B) field

2842, a (C) field **2844**, a (D) field **2846**, an (E) field **2848**, an (F) field **2850**, and a (G) field **2852**. The active_count field **2860** includes a (B) field **2862**, a (C) field **2864**, a (D) field **2866**, an (E) field **2868**, an (F) field **2870**, and a (G) field **2872**. The disctence field **2880** includes a (B) field **2882**, a (C) field **2884**, a (D) field **2886**, an (E) field **2888**, an (F) field **2890**, and a (G) field **2892**.

Values in FIGS. **12**, **14**, **17**, **20**, **23**, and **26** are indicated in the update_timestamp field **2840**, the active_count field **2860**, and the disctence field **2880**, which relate to scores 1, 2, and 3.

As is clear from the node data transition **2800**, the weekly report meeting **618** (id=4) and the regular meeting **620** (id=5) are selected as metadata to be deleted at the point in time illustrated in the example of FIG. **25**. That is, the weekly report meeting **618** (id=4) and the regular meeting **620** (id=5) are the oldest selected or displayed nodes in the (G) field **2852**. The weekly report meeting **618** (id=4) and the regular meeting **620** (id=5) exhibit the smallest value in the (G) field **2872** and the largest value in the (G) field **2892**.

FIG. **29** is an explanatory diagram illustrating examples of a presented screen. The graph generating module **116** generates a metadata graph **2900**A, and the metadata presenting module **126** presents a metadata presented screen **2900**B. Deleted metadata may be presented in such a manner that the recently deleted metadata (metadata deleted in the past within predetermined steps) is discriminated from metadata deleted prior to the predetermined steps. For example, metadata to which a mark such as a department B (recent deletion) **2906**C or the like is added may represent recently deleted metadata, and such a mark might not be added to metadata deleted prior to the deletion of the metadata to which the mark is added.

As illustrated in FIG. **30**, the hardware configuration of a computer according to an exemplary embodiment that executes a program is that of a general computer, more particularly, a computer that is capable of functioning as a personal computer, a server, or the like. That is, for example, a CPU **3001** is used as a processing unit (arithmetic unit), and a RAM **3002**, a ROM **3003**, and an HD **3004** are used as storing devices. The HD **3004** may be, for example, a hard disk. The computer includes the CPU **3001** that executes programs such as the document uploading module **104**, the metadata receiving module **106**, the metadata extracting module **112**, the metadata structure processing module **114**, the graph generating module **116**, the metadata significance calculating module **118**, the metadata searching module **120**, the search UI module **124**, the metadata presenting module **126**, the metadata-corresponding document searching module **128**, the metadata-corresponding document outputting module **130**, and the like, the RAM **3002** that stores the programs and data, the ROM **3003** that stores a program for activating the computer, the HD **3004** serving as an auxiliary storing device, a receiving device **3006** that receives data on the basis of a user operation for a keyboard, a mouse, a touch panel, and the like, an output device **3005** such as a cathode ray tube (CRT), a liquid crystal display, or the like, a communication line interface **3007** that allows connection with a communication network such as a network interface card, and a bus **3008** that allows connection between the elements for data exchange. Plural such computers may be connected via a network.

Among the exemplary embodiments described above, an exemplary embodiment concerning a computer program is implemented by reading the computer program serving as software to a system having the hardware configuration and making the software cooperate with hardware resources.

The hardware configuration illustrated in FIG. **30** is merely an example. The exemplary embodiments may be configured so that the modules explained in the exemplary embodiments can be implemented. For example, some modules may be configured using dedicated hardware (for example, an application specific integrated circuit (ASIC)). Some modules may be arranged in an external system and may be connected via a communication line. In addition, the systems illustrated in FIG. **30** may be connected via communication lines so that cooperative operations can be performed. Furthermore, in particular, the system may be incorporated in a home information appliance, a copying machine, a facsimile machine, a scanner, a printer, a compound machine (an image processing apparatus having two or more of a scanner, a printer, a copying machine, a facsimile machine, etc.), or the like, besides a personal computer.

The techniques explained in related art may be employed as processing details of the individual modules described above.

Furthermore, in the explanation of the foregoing exemplary embodiments, expressions “equal to or greater than”, “smaller than or equal to”, “greater than”, and “smaller than” in comparison with a predetermined value may be “greater than”, “smaller than”, “equal to or greater than”, and “smaller than or equal to” as long as consistency in the combination is maintained.

The program described above may be stored in a recording medium to be supplied or may be supplied by a communication unit. In such a case, for example, the program described above may be regarded as being an invention relating to “a computer readable recording medium in which a program is recorded”.

The “computer readable recording medium in which a program is recorded” is a computer readable recording medium in which a program is recorded, where the recording medium is used for installing the program, executing the program, circulating the program, or the like.

The recording medium is, for example, a digital versatile disc-recordable (DVD-R), a DVD-rewritable (DVD-RW), a DVD-RAM, or the like, which is developed by a DVD forum, a DVD+R, a DVD+RW, or the like, which is developed by DVD+RW, a compact disc read-only memory (CD-ROM), a CD-recordable (CD-R), a CD rewritable (CD-RW), a Blu-ray disc (registered trademark), a magneto-optical disk (MO), a flexible disk (FD), a magnetic tape, a hard disk, a read-only memory (ROM), an electrically erasable programmable read-only memory (EEPROM (registered trademark)), a flash memory, a random-access memory (RAM), a secure digital (SD) memory card, or the like.

The program described above or part of the program described above may be recorded in the recording medium to be stored or circulated. In addition, the program may be transmitted via, for example, a local area network (LAN), a metropolitan area network (MAN), a wide area network (WAN), a wired or wireless network used for the Internet, intranet, extranet, or a transmission medium using the combination of some of the above-mentioned networks, or may be carried on a carrier wave.

Furthermore, the program described above may be part of a different program or may be recorded together with a different program in a recording medium. The program may be divided and recorded in plural recording media. The program may be recorded in any form as long as restoration, such as compression or encryption, can be performed.

The foregoing description of the exemplary embodiments of the present invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously, many modifications and variations will be apparent to practitioners skilled in the art. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to understand the invention for various embodiments and with the various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims and their equivalents.

What is claimed is:

1. An information processing apparatus comprising:

at least one processor, coupled to a memory, that is configured to execute modules comprising:

a presenting unit configured to use the at least one processor to present information related to a search that is being performed on a display;

a selection detection unit configured to use the at least one processor to detect a selection of a et information from the information related to the search that is being performed that is presented by the presenting unit on the display;

a storing unit configured to use the at least one processor to store a plurality of pieces of information and associations between the plurality of pieces of information;

an information extracting unit configured to use the at least one processor to, in response to the selection detection unit detecting the selection of the target information, extract stored information, from the storing unit, that is associated with the selected target information;

a characteristics extracting unit configured to use the at least one processor to extract characteristics relating to the plurality of pieces of information and the associations between the plurality of pieces of information; and

a limiting unit configured to use the at least one processor to, in response to the presenting unit presenting on the display the information extracted by the information extracting unit that is associated with the selected target information and a number of pieces of information to be presented on the display being greater than a predetermined number, limit the information to be presented on the display based on the characteristics extracted by the characteristics extracting unit,

wherein the characteristics extracting unit is configured to extract, as characteristics relating to each of the plurality of pieces of information, a time at which each of the plurality of pieces of information was selected or a time at which information associated with each of the plurality of pieces of information was selected,

wherein the limiting unit is configured to limit the information to be presented on the display by selecting information to be presented on the display by the presenting unit or, when information has already been presented on the display by the presenting unit, by selecting information for which presentation on the display by the presenting unit is to be deleted, in accordance with a comparison between a value based on the characteristics extracted by characteristics extracting unit and a predetermined threshold, and

wherein the presenting unit is configured to present information on the display, using a light color, indicating that the information for which presentation is deleted by the limiting unit was previously presented on the display.

2. The information processing apparatus according to claim **1**, wherein the characteristics extracting unit is configured to extract, as characteristics relating to each of the plurality of pieces of information, in a case where a piece of information is selected, a number of pieces of information associated with the selected piece of information or a number of times information associated with the selected piece of information has been selected.

3. The information processing apparatus according to claim **1**, wherein the characteristics extracting unit is configured to extract, as characteristics relating to association between a plurality of pieces of information, a value based on a number of times one of selected information and target information that are associated with each other in a path has been selected.

4. A computer-implemented information processing method comprising:

presenting information related to a search that is being performed on a display;

detecting a selection of target information from the information related to the search that is being performed that is presented on the display;

storing, in a storing unit, a plurality of pieces of information and associations between the plurality of pieces of information;

in response to the detecting the selection of the target information, using a processor to extract stored information, from the storing unit, that is associated with the selected target information;

extracting characteristics relating to the plurality of pieces of information and the associations between the plurality of pieces of information; and

in response to the extracted information that is associated with the selected target information being presented on the display and a number of pieces of information to be presented on the display being greater than a predetermined number, limiting the information to be presented on the display based on the extracted characteristics,

wherein the extracting characteristics comprises extracting, as characteristics relating to each of the plurality of pieces of information, a time at which each of the plurality of pieces of information was selected or a time at which information associated with each of the plurality of pieces of information was selected,

wherein the limiting the information to be presented on the display comprises selecting information to be presented on the display or, when information has already been presented on the display, selecting information for which presentation on the display is to be deleted, in accordance with a comparison between a value based on the extracted characteristics and a predetermined threshold, and

wherein the presenting information further comprises presenting information on the display, using a light color, indicating that the information for which presentation is deleted was previously presented on the display.

5. A non-transitory computer readable medium storing a program causing a computer to execute a process for performing information processing, the process comprising:

presenting information related to a search that is being performed on a display;

detecting a selection of target information from the information related to the search that is being performed that is presented on the display;

storing, in a storing unit, a plurality of pieces of information and associations between the plurality of pieces of information, in response to the detecting the selection of the target information, using a processor to extract stored information, from the storing unit, that is associated with the selected target information;

extracting characteristics relating to the plurality of pieces of information and the associations between the plurality of pieces of information; and

in response to the extracted information that is associated with the selected target information being presented on the display and a number of pieces of information to be presented on the display being greater than a predetermined number, limiting the information to be presented on the display based on the extracted characteristics,

wherein the extracting characteristics comprises extracting, as characteristics relating to each of the plurality of pieces of information, a time at which each of the plurality of pieces of information was selected or a time at which information associated with each of the plurality of pieces of information was selected,

wherein the limiting the information to be presented on the display comprises selecting information to be presented on the display or, when information has already been presented on the display, selecting information for which presentation on the display is to be deleted, in accordance with a comparison between a value based on the extracted characteristics and a predetermined threshold, and

wherein the presenting information further comprises presenting information on the display, using a light color, indicating that the information for which presentation is deleted was previously presented on the display.

6. The information processing apparatus according to claim **1**,

wherein the selection detection unit is configured to receive, from a user, the selection of the target information.

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